HARPER'S WEEKLY.
A JOURNAL OF CIVILIZATION.

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NEW YORK, SATURDAY, FEBRUARY 23, 1889.

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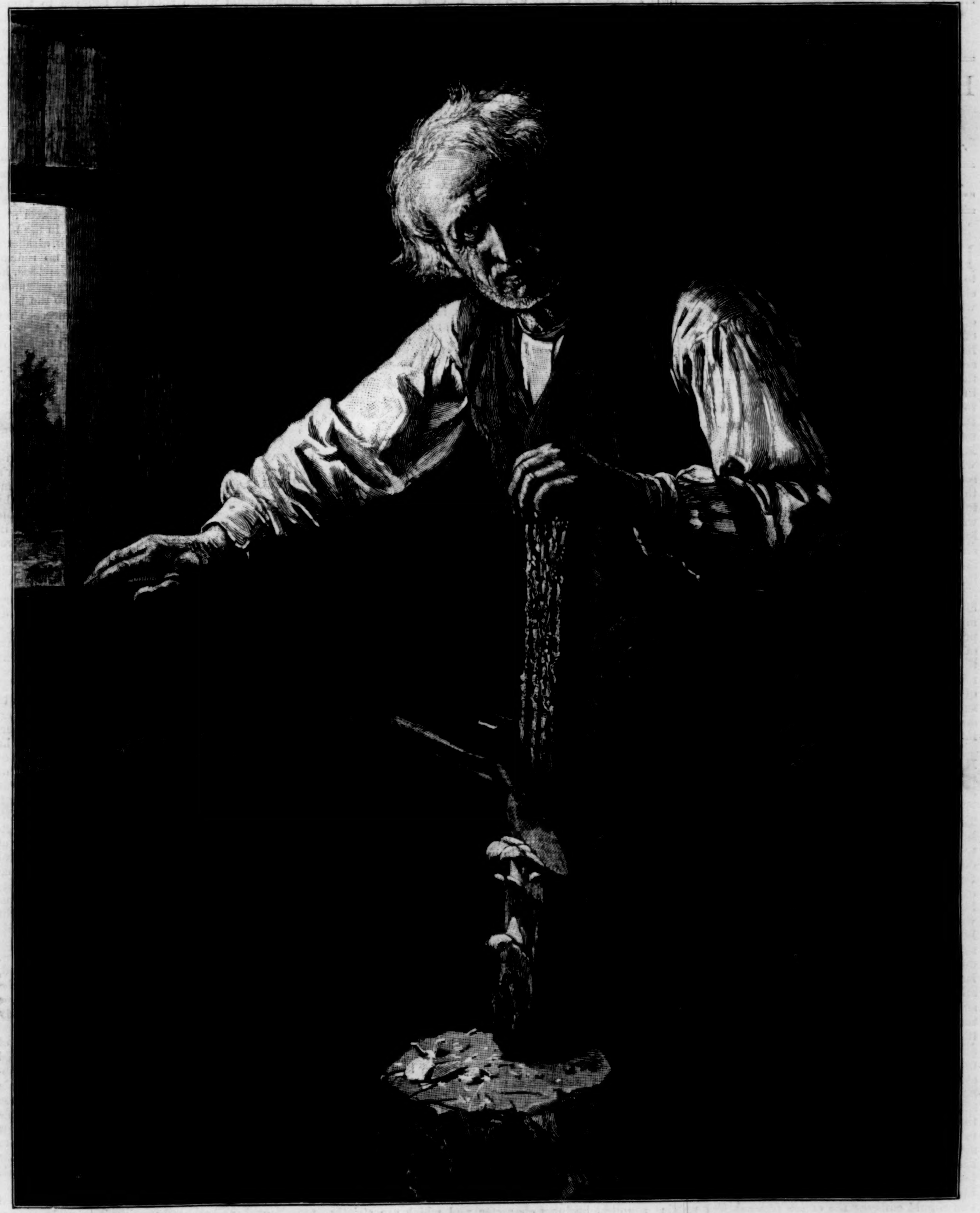
WITH A SUPPLEMENT.



"THE OLD MECHANIC."—From the Painting by J. G. Brown.

"A marvel. It is edited with wise and skilful tact. It instructs while it amuses."—*Boston Congregationalist.*

HARPER'S YOUNG PEOPLE,

An Illustrated Weekly for Boys and Girls.

The number for February 19th contains the first part of "Coots, the Story of a Day's Ducking," by John Francis Adams, *with an illustration by* H. F. Farny; *the ninth instalment of "Captain Polly," by* Sophie Swett, *illustrated by* Rosina Emmet Sherwood; *and a pretty little story called "Edna with the Red Cloak."*

GEORGE WASHINGTON'S SCHOOL-DAYS,

BY WILLIAM F. CARNE,

contains some very curious extracts from note-books in Washington's *own handwriting, which seem to have been overlooked by his biographers. The article will be concluded in the following number.*

The current issue contains also "The Painter Rubens and his Children," with two engravings; "Boyhood in Other Lands," by Agnes Carr Sage; *and a humorous poem by* Harriet Prescott Spofford.

Harper's Young People, $2 00 per Year.

A specimen copy sent on application.

HARPER'S WEEKLY.

New York, February 23, 1889.

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An Illustrated Supplement *is issued gratuitously with this number of* Harper's Weekly.

ADMINISTRATIVE REFORM.

IT is a curious and interesting fact that the question of reform in the civil service, which was alleged to have been finally disposed of by the Presidential election, has been the one question of public interest which has been generally discussed since the event of the election was known. The subject was never of more general interest than at this moment, and, like all great reforms, it is strengthened by the character and methods of its opponents. The debate in the House has been followed by a much longer debate in the Senate upon a motion to add one or two clerks to the force of the Commission. The inclusion of the railway postal service within the classified system has been followed by the peremptory removal of Mr. Edgerton, the chairman of the Commission, who by a grotesque fate is one of the most scornful sceptics and foes of reform. The circumstances of the removal are to be regretted. Mr. Edgerton's total want of faith or interest in the reform which he was appointed to superintend and enforce has been long familiar. He has never sought to conceal it, and it has been a scandal. He should have been removed long ago. But his removal on the eve of the inauguration of the new President, and the appointment of a successor who, if confirmed, would probably remain as the Democratic member of the Commission, suggests that the purpose may have been provision for Mr. Thompson as well as the interests of reform. There is this, however, to be said, that as the law requires that all the members of the Commission should not be of the same party, the selection of Mr. Thompson by President Cleveland saves his successor the difficult task of choosing a Democrat, and secures a Commissioner who has shown a sincere interest in the reform.

Besides these incidents, however, the debates in the House and the Senate have revealed the interesting fact that there is a strong and resolute Republican conviction upon the subject upon which President Harrison, if he be so disposed, can safely depend. The speeches of Mr. Cabot Lodge and other Republicans in the House, and of Senators Hoar and Hawley in the Senate, were very significant. The last defence of the abuse of partisan patronage which reform had to carry was what in military phrase is called the firing line, that is to say, the active party leaders in public life. The three gentlemen whom we have mentioned are among the representative leaders of the best Republican sentiment upon this subject, and they are not men who are likely to abandon their position at the command of such other leaders as Messrs. Ingalls, Plumb, Quay, Dudley, and Platt. In the debate in the Senate, Mr. Allison, we are sorry to say, turned a cold shoulder to the reform. But Senator Hawley read the resolution of the Republican platform, which is a deliberate and solemn pledge, and he advised young statesmen to count upon Republican fidelity to the pledge. Senator Hoar, an old and constant friend of reform who has the entire courage of his opinions, like Senator Sumner, whose seat he fills, declared his satisfaction that President Cleveland by including the postal railway service had extended the area of the reformed system; denounced the scandal and shame of Republican partisan abuse of patronage, which had become intolerable, he said, to the Republican majority in his State; declared his belief that the reformed system should embrace the entire non-political public service; and, with the same sincerity of conviction, sharply but amusingly scored the mugwumps for their want of faith in those who were guilty of the shame and scandal which he denounced. With all his causticity of censure, no Republican has more regretted than Senator Hoar the defection of the mugwumps as a kind of wrong to a great cause. But should his views, instead of the old shame and scandal which he describes, prevail in the Republican administration, he will find no more constant coadjutors than the mugwumps.

Mr. Foulke, the late president of the Indiana Reform Association, who warmly supported General Harrison, states clearly and strongly in his late address the logical Republican position under the pledges of the Republican platform, and points out the fact that reform in the civil service is an executive reform devolving upon the President. We have already said that every President must decide for himself what his party really desires. President Harrison's course will show whether upon this subject the Republicanism of Messrs. Hoar, Hawley, and Lodge is his own. If such should prove to be the fact, he too would find the most earnest support from those whose votes for other reasons were cast against him. As Senator Hoar truly remarked, it is an administrative reform, and consequently it is useless for either party to taunt the other with its shortcomings in a direction in which both parties should advance willingly.

THE NEW YORK CUSTOM-HOUSE.

The Byrne report upon frauds in the New York Appraiser's office has been laid before the Senate, and copies have been at last seen elsewhere. It is upon the authority of this report that extensive removals have been made, the characters of public officers hitherto unsuspected have been questioned, and a vast system of frauds has been alleged. The New York *Times*, a journal very friendly to the Secretary of the Treasury, has expressed its views upon the report, and of the action based upon it, in an article which is a model of moderation and candor and of newspaper discussion. It concludes that as a basis of charges of sugar frauds at the Custom-house, the report is simply worthless; that the most which can be said of it is that it presents statements which may call for proper investigation; and that the Secretary of the Treasury by resting his action upon it has exposed himself to the risk of doing irreparable wrong to gentlemen both in and out of the public service, and a cruel injustice to the business men of New York. The injury done to the good name of many public officers upon such a basis as Byrne's report of an inquiry conducted under the most suspicious conditions is largely irreparable. But the charges against the honesty of the public service at this port ought not to remain unnoticed.

If there have been frauds to the amount of some millions of dollars in the appraising of sugars, somebody is guilty, and somebody should be publicly and plainly made to answer for his guilt. There has been, indeed, so much scandal stimulated, so much suspicion and accusation and allegation sown broadcast in the public mind, so much loss asserted, and confidence in the customs administration here has been so deeply shaken, that there should now be a thorough and trustworthy examination by competent persons of character, whose statements and conclusions would command universal confidence and respect. If the New York Custom-house is "rotten through and through," let facts be submitted to a candid world. President Harrison could do no better service than to order such an investigation. A clean sweep of every officer and employé in the Custom-house would not remove the stigma, because that would be in itself obviously an injustice. What is wanted is light. Experience is the best teacher, and undoubtedly, without assuming dishonesty, methods of customs administration may be constantly improved, and this is especially true of the undervaluation of imports, if wise reforms of administration should be re-enforced by legislation such as proposed by the Senate sub-committee on Finance. It is, of course, a question whether losses can ever be prevented under an *ad valorem* method of assessment, with high rates. The United States, we believe, is the only great nation which adheres largely to *ad valorem* rates. It may be true that specific rates operate unequally and conceal the amount of protection, but they can be administered uniformly and honestly, which is impossible with *ad valorem* rates. The whole customs system in its methods and rates requires frequent and careful revision, and there can be no better time for a complete inquiry into its actual condition than such as now presents itself, when misconduct involving great losses of public revenue is alleged at the chief custom-house in the country.

An interesting and timely publication in connection with the subject is that of the employés of the Naval Office, which this year completes its centenary. It contains a brief history of the origin and business of the office; its present organization and distribution of duties; the official regulations, which are of the soundest business character, and which are strictly and effectively enforced by the present Naval Officer; and a complete roster of the office, showing how faithfully the reformed system has been observed in appointments. Of the total of 102 employés, all but 25 have been appointed under the rules, and the exceptions are the experienced officers who were appointed before there were any such rules. The Naval Office as administered under the reformed system challenges investigation. For every reason such an investigation has been made desirable by the transactions in the Appraiser's office, and as the practical result of the election is the maintenance of a high protective system, and as the friends of protection do not deny the opportunities for illicit transactions which any custom-house system must offer, they may wisely seek in the interest of protection itself to satisfy the public mind that the methods of administration of the customs laws at the chief custom-house are made as efficient and are as carefully guarded as possible. Such an investigation, conducted by an administration which should be believed to intend reform in the sense advocated by eminent Republican leaders, could not fail to be of the highest value to the public service, and to the party which should conduct it in a manner different from that of Mr. Byrne.

LINCOLN'S BIRTHDAY.

The celebration of Lincoln's birthday was never so general as this year, and it is evident that if not made legally a national holiday, it will be hereafter none the less generally and sincerely observed. General Porter in his speech happily pointed out how essentially Lincoln was a man of the people. But he was a representative of their best instincts and their nobler qualities. His Americanism in the true sense was shown by the manner in which, although a lawyer of conservative habit and of no radical enthusiasm, as the word is generally understood, he always held fast as a practical axiom of government and a fundamental rule of government to the principles of the Declaration of Independence. They were not to his mind, as to another great lawyer—Rufus Choate—"glittering generalities"; they were truths to be recognized in political conduct.

No man was more sociable than Lincoln, and Mr. Isaiah Arnold, in his reminiscences of the Illinois bar of the last generation, tells many an anecdote of his humor and fun. His knack at concentrating wisdom in a jest, Emerson compared to the shrewdness of Æsop, while the tact with which this faculty is always allied was in Lincoln a consummate skill in statesmanship. This is shown constantly in Hay's and Nicolay's *Life of Lincoln.* If all the circumstances are considered, there are no passages in the history of state-craft which reveal more remarkable knowledge of human nature and the highest skill in the conduct both of men and affairs than the correspondence between Lincoln and Seward at the beginning of the war, when Mr. Seward sincerely felt it necessary to put the President in commission; and again in Lincoln's modification of some of Secretary Seward's foreign despatches; and once more in his adjustment of the difficulty arising from the request of the Republican Senators during the war that Mr. Seward should be dismissed from the cabinet. The sagacity evinced by Mr. Lincoln in these transactions and many more was of the very highest. It was not Machiavellian, it was Lincolnian; that is to say, it was the masterly wisdom and skill of a perfectly simple, honest, and patriotic man. It is perhaps as true of Lincoln as of Washington that he said and did nothing in the tremendous exigencies of his time that his countrymen would now regret or change, and it is as hard to think of the civil war without Lincoln as of the Revolution without Washington. In the great qualities of speech for an occasion of the deepest significance the address at Gettysburg is unsurpassed by the words of any orator at any time, and the pathetic grandeur of the inaugural address of 1865 lingers in the memory like the majestic music of Isaiah.

But with all his sociability and marvellous genius for public affairs at one of the most important epochs in history, Lincoln had the sadness and solitariness of all great souls. He touched his companions on every side with tender sympathy and subtle humor. He put his arms around them and smiled and jested, but he walked the path of duty alone. His independence and his moral courage were not conscious and proud and defiant. No man pricked so deftly the bubble of false pride, and personally he assumed absolutely nothing. But in the great moments of life, after hearing patiently all counsels, he followed his own. No incident in his life, so rich in memorable incidents, is more significant, and as an example and encouragement more inspiring, than his course when he was a candidate for the nomination to the Senate in the Illinois Legislature. He called a few chosen friends to hear the speech that he proposed to make, in which occurs the passage alluding to the Union and slavery—"A house divided against itself cannot stand." His friends, amazed and alarmed at the probable interpretation of such a remark, advised unanimously and earnestly against it, as, under the circumstances, a foolish throwing away of his chances. Lincoln heard them quietly, and with that grave, wistful look which those who knew him can well recall, and in the evening he delivered the speech without modifying the phrase. A man so true to himself could not, of course, be false to any man. No man's life can be read with greater satisfaction. To call him one of Plutarch's men is perhaps to invest him with an aspect a little strange. His heroism was a moral quality, but its form was not "classic." Human qualities in Attica or in Illinois are indeed essentially the same, but the stamp, the glamour, differs. In a high sense **Lowell**'s phrase is true of **Lincoln**—"The first American." It is our happiness that we cannot forget him, and that as we must needs look at him, we must look up to see him, and that whoever would be such an American as **Lincoln** must go up higher.

TEMPERANCE LEGISLATION.

It is pretty clear that there will be no temperance legislation in New York this winter, notwithstanding the fact that the Republicans made high license the campaign cry under which they secured control of the Legislature. The bill of the Excise Commission, although, as we pointed out, a compromise, as indeed any bill must be, did promise to restrain the traffic, and therefore as a practical scheme, although quite below the manifesto of the campaign, it might have been wisely made the measure upon which all temperance legislators would unite.

But the introduction of another Republican bill, and the opposition to the Commission's bill of the body called anti-saloon Republicans, have by common consent killed the Commission bill, and with it the chance of high license legislation this year. In the public interest this is to be regretted, and it seems to be a Republican blunder. We doubt whether the Governor would have signed the bill. But when it became clear that it was favored by men like Dr. **Crosby**, and by the committee which drew the vetoed bill of last year, the fact that it was not so high a license bill as could be wished was not a reason for preventing its passage. The opposition is a party blunder, because it tends to confirm the suspicion, which is very strong with earnest temperance men, that the Republicans are only fooling with the subject.

To this feeling it is useless to reply that restrictive liquor legislation is Republican legislation, because the New York temperance voter who supported the Republican ticket last November as the best practical way to secure some progress in the cause sees precisely what everybody else sees, that the passage of a moderate measure, proposed by a Commission upon which there were five Republicans and only two Democrats, has been defeated by Republicans. That is the one fact which will be seen and remembered, and the ingenuity which points out defects in the bill when tested by an absolute standard will be forgotten. It is another of the instances in which the politicians of a party overbear the wish of the party. There is no doubt that the distinctive Republican sentiment is favorable to restriction of the liquor traffic, but there is no doubt also that this sentiment is constantly baffled by Republican politicians who fear to alienate the liquor vote. Dr. **Crosby** states the common feeling in saying that the bill which has countered the Commission bill was introduced "purely for political purposes, and was not intended for the benefit of the public."

GENERAL SHERMAN AND CONFEDERATE SOLDIERS.

General Sherman has written a letter in regard to the proposal to ask subscriptions in New York and elsewhere for a home in Austin, Texas, for disabled Confederate soldiers. The General says truly that there is no question of the impartial generosity of the city of New York. But of course Austin is far away, and explanations and details and guarantees would be properly demanded, which he suggests the agent of the enterprise to provide. He adds that he would prefer another method to relieve "the Confederate soldier made prematurely old by the vicissitudes of a war he could not prevent," but that any means of aiding them receives his sympathy and good wishes.

He said further, in an interview, that the homes provided for the Union soldiers should be opened also to the Confederates, and the word "Union" should be blotted from the statutes so far as they apply to the homes, so that the homes should be open to all soldiers. To this the agent objected that the government could hardly pension or provide for those who fought against it. But General **Sherman**'s remark was in the spirit of **Sumner**'s proposition to strike from the flags the names of victories over fellow-citizens. It was in this spirit that General **Grant** constantly spoke upon the subject, and General **Sherman**'s words add fresh lustre to his fame. There need be no fear that the significance of the war will be forgotten, or that the meaning of such generosity will be misconstrued. It is the soldiers upon both sides who have been first in magnanimous treatment of the memories of the war.

A SCANDALOUS CEILING.

There is a pretty large scandal connected with the ceiling of the Assembly Chamber at Albany. A new ceiling was ordered last year to be put up under the supervision of a committee of conspicuous gentlemen, and a ceiling has been completed. But the statistics and details of the work which have been published reveal apparently an enormous job, which, without clear explanation, will dangerously discredit the members of the committee. The figures which have been published without contradiction are in their way as extraordinary as the exposures of some of the jobs of the **Tweed** Ring.

The Capitol at Albany is the crowning illustration of the unpleasant fact, which Mr. **Bryce** probably does not consider to be peculiar to the American commonwealths, that a public work is often or generally a dishonest work. No enterprise is proposed to be undertaken by public authority for the public benefit which is not at once regarded as certain to be a disgraceful job. When a Capitol was proposed twenty years ago to be erected at an expense of $4,000,000, the scheme was regarded with bated breath as almost imperially extravagant. The Capitol has already cost, we believe, nearly $18,000,000, and it is not yet completed.

If now to the great job subsidiary jobs are to be added, growing out of previous jobbery, the New York Capitol will be a monument of much more than the liberal public spirit of the State. Like the New York Court-house, it will remind the spectator that the shrewdest people under the sun can scarcely hope to put up an honest public building. Yet we believe this fact, impossible in New York, has been achieved in Indiana.

THE THREATENED PARKS.

As there is nothing more desirable to secure for a rapidly growing city than frequent parks, the **Ives** bill, which empowers the Park Department to sell at its pleasure any part of the land designated for the new parks, is a very serious blow at the city. The object is to sell building lots, and the consequence will be the reduction of the park area and an enormous stimulation of speculation, by which the city will be deprived of the benefit which it was the object of the parks to secure.

The new parks are part of a vast scheme of public improvement for the health and the beauty of the city. No such improvement can be carried out without offering enormous opportunities of private and associated profit, if only the scheme can be diverted in any degree from its public purpose. There is an immense cleverness always on the alert in New York to turn public opportunities to its own advantage. Nothing is more certain than the persistence and ingenuity of its schemes. Nothing is more necessary, if those schemes are to be baffled, than equal tenacity and sagacity in opposing them. The advantages and in a high sense the necessity for a population like that of New York of all the breathing space and all the ground for recreation that can be secured are undeniable. They are axioms.

But the authorities are empowered by the **Ives** bill "to sell so much of the land as may be considered to be unnecessary or undesirable for park purposes." They may sell what they choose. This is an enormous power. There is no occasion for reflecting upon the authorities to whom the power is given, but it is obvious that the better way is to devote all the land to the public purposes for which it was designed. If such is not seen to be the public sentiment, however, the bill will probably pass the Legislature upon the ground that there is no objection. But there are Assemblymen from the city from whom a protest in behalf of the intelligent view of the subject may be fairly expected.

GLIMPSE OF A FREE LIBRARY.

Mr. Sidney S. Rider, who issues monthly in Providence a little sheet called *Book Notes*, in which he gossips at his pleasure of books and other things, describes a recent pleasant visit to the Free Library in Pawtucket, a flourishing manufacturing town near Providence. The visit, he says, was an object-lesson. It was in the evening, and in a room bright with electric-lights and warm sat some fifty boys poring over the London *Graphic* and *Illustrated News* and **Harper's Weekly**, while at other tables men were reading magazines, and women and girls at their own tables were engaged in the same way.

At the extreme end of the room were the bookshelves of ten thousand volumes, along which boys ranged at will, taking down books at their pleasure. To Mr. **Rider**'s surprised question whether such freedom could be safely permitted, the librarian replied that nothing was ever seriously displaced, while the theft or mutilation of books was almost unknown. A boy brought up a book to be entered; it was a bound volume of the *Century*. Another followed with **Stanley**'s *Through the Dark Continent*. One boy had the Iliad in **Pope**'s translation; the next, a volume of **Bancroft**'s history, and when Mr. **Rider** asked if he worked in the mill, he answered, "Yes, in the Dexter Yarn Mill." The boys were not selected; they were noted as they came.

Upon a little inquiry it appeared that the boys when they first came had the boy's taste for dime novels and mischief; but a little frank, firm, good-natured talk from the director and the librarian, a sensible man and woman, had worked the wonder, which Miss **Burt** in the school at Chicago had also wrought, and taught the boys and girls to prefer the better book. *Robinson Crusoe*, the *Swiss Family Robinson*, and their kind are as entertaining to the boy, if he were but made to know it, as *Blue Skin* and *Black Bess* and *Sixteen-string Jack*. Mr. **Rider** says truly that the Free Library mill boys of to-day will be the real strength of Pawtucket to-morrow, and he exhorts every village in Rhode Island to consider Pawtucket, and then go and do likewise, "for no town's money can be so well expended." That is a truth which may be profitably meditated in larger States than Rhode Island.

THE NEW YORK SUPERINTENDENT OF PUBLIC INSTRUCTION.

The State of New York is to be congratulated upon the re-election of Mr. **Andrew S. Draper** as Superintendent of Public Instruction by the unanimous renomination of the Republican majority in the Legislature. We have had frequent occasion to speak of the great intelligence, earnestness, and public spirit with which Mr. **Draper** has discharged the duties of his office, of whose dignity and importance he has a just conception; and he has a profound interest in the subject of popular education. Indeed there is no office in the State which offers to the right man an ampler field of beneficent public service, and Mr. **Draper**'s force, candor, and executive ability, his clear comprehension and his admirable faculty of lucid exposition, make him the right man. It is a great satisfaction as well as a great benefit when an office so influential is so wisely and effectively administered.

THE DEPARTMENT OF AGRICULTURE.

The creation of a new national Department of Agriculture and the nomination of an eighth member of the cabinet is an important event. The existence of a bureau with a Commissioner forecast both the Department and the Secretary, although the precise limit of the new charge is not defined. Popularly the bureau has been regarded hitherto as chiefly an agency for the distribution of seed and agricultural information, and to be justified upon the same general ground with the "parcels-express" function of the Post-office. The exact value of the service of the bureau it would be probably not easy to define.

The selection of the existing Commissioner for the brief honor of the new Secretaryship during the few remaining days of the administration was a testimony to his faithful and intelligent service, which is admitted on all sides. The tenure will be very brief, and the new office puts another high political prize into the hands of the new President. The first annual report of the second Secretary, who must practically organize the new Department, will naturally contain a statement of the scope and character of its work. For there is no doubt that the country is not yet aware why the useful functions of a bureau require the dignity of a department organization.

PERSONAL.

A pleasant custom is observed by the son and daughter of Mr. D. O. **Mills**, who has lived alone at his house in this city much of the time since the death of his wife. The son, Mr. **Ogden Mills**, entertains his father at dinner on one evening, the next evening Mr. **Mills** is the guest of his daughter, Mrs. **Whitelaw Reid**, at her home, and on the third evening he is the entertainer of his children, the rotation being so observed that the father never dines alone.

—The alumni of Williams College have raised $75,000 for a monument to the late Dr. **Mark Hopkins**, for so many years president of the college. The monument is to take the shape of a building at Williams, and it is suggested that the sum be increased to $100,000, and the building be made of stone, as typical of the sturdy character of the grand old teacher and theologian.

—**Frank Shannon**, of Philadelphia, has been given a gold medal by the woman's branch of the Society for the Prevention of Cruelty to Animals, for thrusting his arm down a hyena's throat and extracting a bone that was choking the animal to death, in the Quaker City Zoological Gardens.

—Mrs. **Nancy Clark Marshall Winkle Smith Frisbee McGregor Rawlins**, a rich and somewhat masculine woman, who owns valuable cattle and timber lands in Montana and Oregon, has lately reached the extreme Scriptural limit of marrying chronicled of her sex by taking unto herself her seventh husband. She went to San Francisco over the plains in 1849, and the uncertainties of border life have enabled her to gratify her taste for marital change without resort to divorce. Every one of her husbands was dead before another took his place. One was lost in a mountain snow-storm, another was killed by Indians, and a bucking horse assisted another out of the world. Husband No. 7 is twenty-eight years old. He was raised by the much-widowed woman, and calls her "Mamma."

—**James H. Jones**, a colored Republican Alderman at Raleigh, North Carolina, was **Jefferson Davis**'s slave and body-servant when the President of the Southern Confederacy was captured by Union soldiers. He keeps up a correspondence with his former master, and received his photograph as a Christmas present last month.

—Mrs. **Harriet Beecher Stowe**'s recovery from her apparently fatal illness of last fall is most remarkable. She walks about her house and grounds at Hartford, Connecticut, although still quite weak, and some of her friends have received letters from her written in a firm hand.

—A monument has been erected at Redding, Connecticut, in memory of General **Israel Putnam**. It stands on the ground where, with eight hundred Continental soldiers, he was encamped during the terrible winter of 1778–9, and steps are now being taken to turn the place and its surroundings into the Putnam Memorial Park. Thirty-two acres of land have already been given for the purpose, and the State Legislature will be asked to appropriate $25,000 for carrying out the plan. The site chosen for the park is wild and rocky, and huge trees, which are probably as old as the nation, still stand guard over the spot.

—**Campanini**, the singer, who was so rich six years ago that he could invest $300,000 in a great manorial estate in Italy and stock it with game, horses, and dogs, has met with serious financial losses of late, and is said to be in straitened circumstances.

—The Emir of Afghanistan had a narrow escape from assassination recently while reviewing a body of troops in the presence of the British Envoy and other guests. A sepoy in a Herati regiment suddenly wheeled as he was passing by and fired at the Emir, the bullet splintering his chair. An officer promptly killed the sepoy, and the parade went on.

—Both branches of the Maine Legislature took a recess the other day to give a reception to **Elihu Stevens**, of Belgrade, who is one hundred and one years old, a pensioner of the war of 1812, and the father of twenty-two children.

—Miss **Susannah Warfield**, who composed the march which was performed at the inaugural ball of **William Henry Harrison**, lives near Sykesville, Carroll County, Maryland, and is over ninety years old.

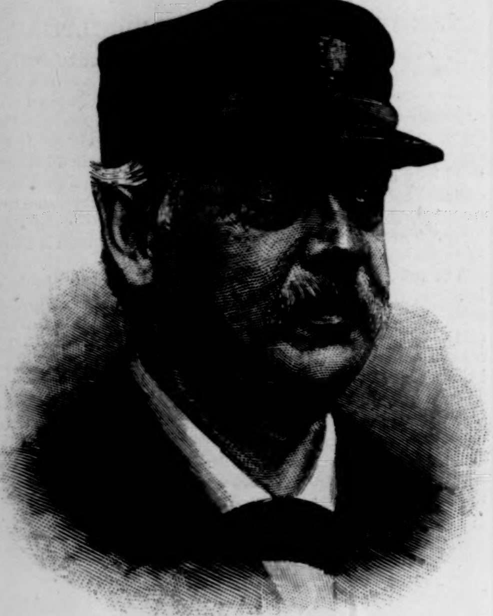
—Mrs. **Nancy Edgerly** died recently at Wolfborough, New Hampshire, at the age of one hundred and four years. She rode with her mother on horseback to Philadelphia to witness the celebration attending the adoption of the Constitution of the United States.

—Emperor **William** of Germany has an annual income of over $3,300,000, but has found it necessary to ask the Prussian Diet to add about $900,000 to his spending money.

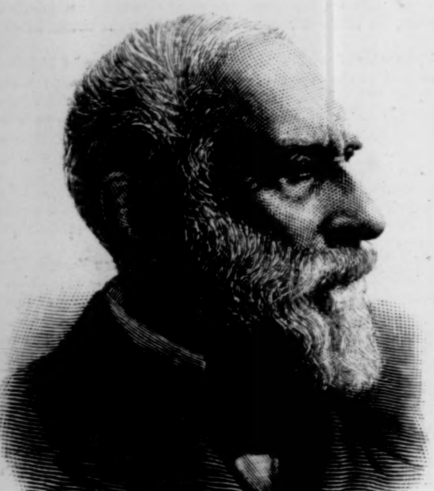
—**Jay W. Cowdrey**, of Hartford, Connecticut, a "Christian scientist," fell in a faint during a recent lecture, and just after having made the statement that "Christian science can defy death," and died the next day.

—The double reputation of a life-saver on land and sea has been won by **Arthur H. Rowe**, of Gloucester, Massachusetts. Besides participating in several daring rescues of shipwrecked people, he has stopped sixty runaway teams.

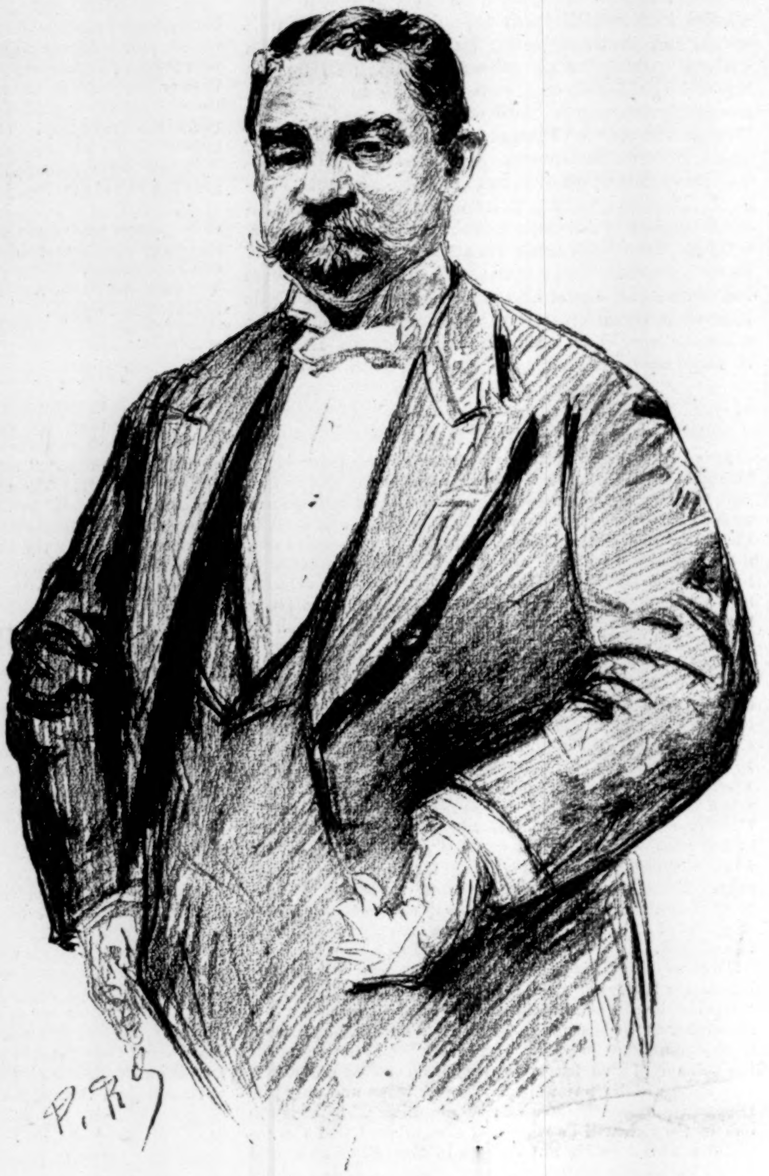
—Among the most sacred penates of many a Yale graduate is a carefully treasured bit of the famous fence which was torn down last summer to make room for the new Memorial Building. After it had been doomed, the favorite roosting-place of past generations of students began to disappear by piecemeal, and finally large sections were carried off, presumably by the secret societies, so that the workmen had little to do in completing its removal. Miss **Ella Oakford**, a graduate of the Yale Art Department, has now prepared a limited number of etchings of the fence, and these, accompanied each by a piece of the revered structure, are to be disposed of as souvenirs.



THE LATE REAR-ADMIRAL RALPH CHANDLER.—[See Page 147.]



THE LATE COLONEL HENRY JACKSON HUNT.
From a Photograph by Bell.—[See Page 147.]

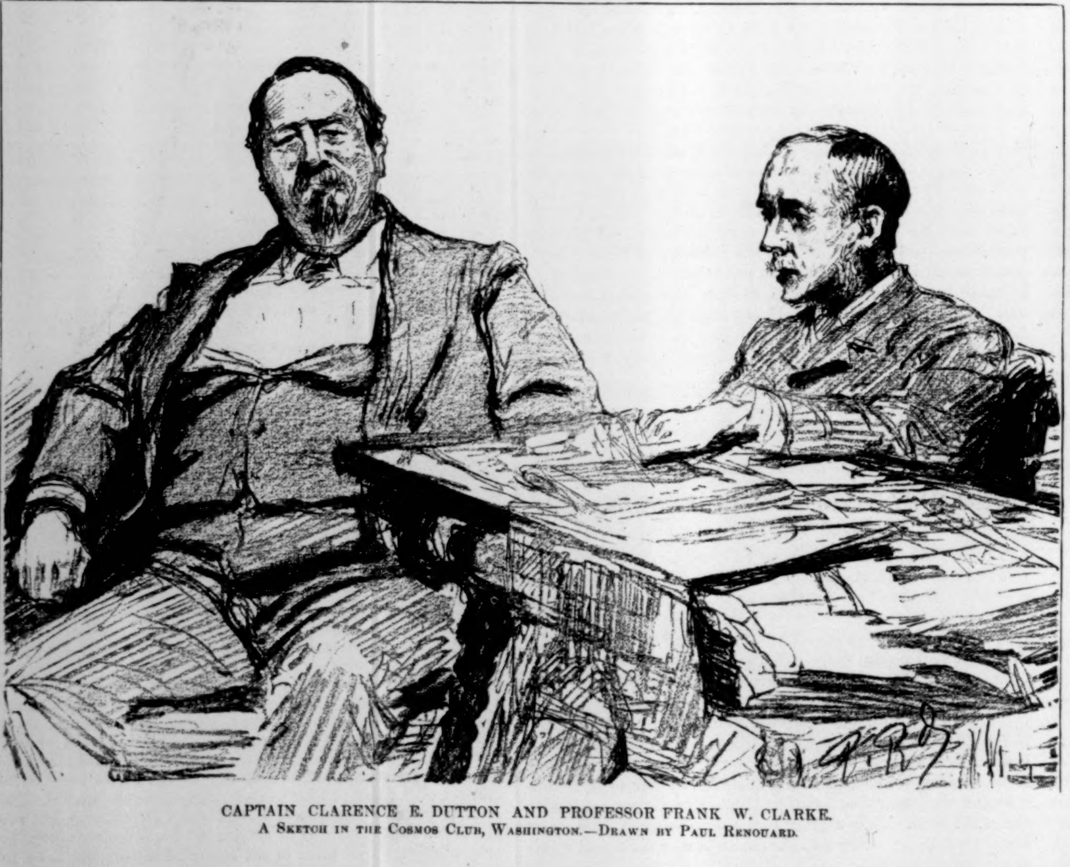


HENRY C. YARROW, M.D., OF WASHINGTON.—Drawn by Paul Renouard.—[See Page 147.]

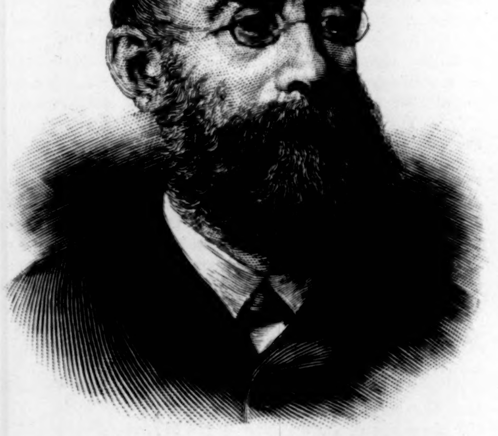
CAPTAIN DUTTON AND PROFESSOR CLARKE.

M. Renouard's small group, showing Captain Clarence E. Dutton and Professor Frank Wigglesworth Clarke seated at a table in the parlor of the Cosmos Club in Washington, represents the former in a lounging attitude which would convey the impression, to one who had not seen him, of a man of very large proportions. As a matter of fact, Captain Dutton is of good height and ordinarily full figure, the perfect picture of a hearty, well-preserved army officer of forty-seven years. He is a graduate of Yale College, of the class of 1860, of which Professor O. C. Marsh and Representative William Walter Phelps are among the other distinguished members. At the outbreak of the war he entered the Union service as Adjutant of the Twenty-first Connecticut Volunteers, and two years later was transferred to the ordnance corps of the regular army, as the result of a competitive examination in which some sixty officers took part, and only three or four were passed. He had charge, for one share of his active service, of the ordnance depot at City Point during the siege of Richmond. After the war he was assigned to the Watervliet Arsenal, where he became interested in the study of iron and steel. While there he read the first scientific paper ever written in this country on the chemistry of the Bessemer process. His investigations in this field led him to the examination of iron ores and their deposits, and thence he passed by easy stages to the study of geology in general. In 1874, having in the mean time been transferred to the Washington Arsenal, he was detailed, at the request of Professor Joseph Henry and Major J. W. Powell, to take the field as a geologist. He has accomplished the geological survey of the Grand Cañon district of Colorado, the high plateaux of central Utah, and a large part of northwestern New Mexico and Arizona, and has begun the survey of the Cascade and Coast ranges of northern California, Oregon, and Washington Territory. Since 1879 he has given up ordnance duty entirely, and been attached to the United States Geological Survey. His special forte is physical or dynamic geology, with direct reference to mountain structures, earthquakes, and volcanoes. In 1882 he made a trip to Hawaii, under the auspices of the Smithsonian Institution, to study the volcanoes there, and he has now in the hands of the printer a volume on the Charleston earthquakes. He has published at various times six monographs and nearly a hundred miscellaneous scientific papers.

Captain Dutton's tastes are catholic, however. He is very fond of and very well informed on political economy. His pamphlet on the silver question, published some years ago, is a scholarly exposition of the monometallic theory in finance; and President Hayes appointed him in 1879 secretary of a commission authorized by Congress to prepare a codification of the public land laws of the United States. There is scarcely a subject, indeed, within the whole range of literature, science, or philosophy in which he is not interested, and he has a rare faculty for clothing his views in the plainest form of expression. He was recently elected to succeed Dr. Yarrow as president of the Cosmos Club.

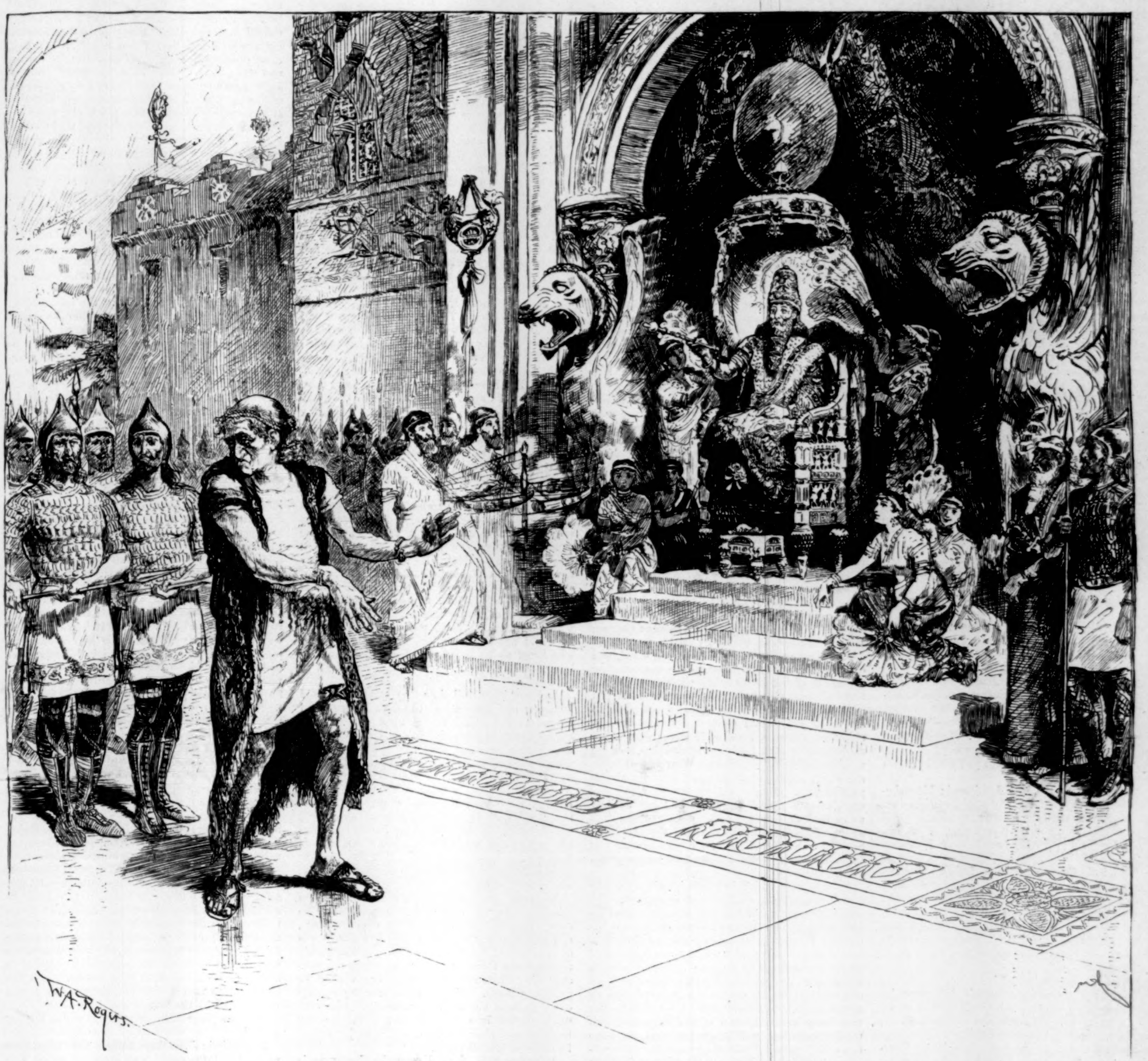


CAPTAIN CLARENCE E. DUTTON AND PROFESSOR FRANK W. CLARKE.
A Sketch in the Cosmos Club, Washington.—Drawn by Paul Renouard.



THE LATE JOHN CALL DALTON, M.D.
From the Painting by Eastman Johnson.—[See Page 147.]

His companion in the picture, Professor Clarke, is the chief chemist of the Geological Survey, and curator of the mineralogical collection in the National Museum. He was born in Boston in 1847, and graduated at the Lawrence Scientific School, Harvard University. For some years he was Professor of Chemistry at the University of Cincinnati. He was called to his present office in 1883, when it was created. Among his published writings are *Weights, Measures, and Money of all Nations*; *Elements of Chemistry*, a text-book for schools; a serial prepared and issued under the auspices of the Smithsonian Institution, bearing the general title, *Constants of Nature*, and containing full tables of the specific gravity of all solids and liquids, of specific heat, and of coefficients of expansion, and also a complete recalculation of atomic weight; a report on the Teaching of Chemistry and Physics in the United States, brought out by the Federal Bureau of Education in 1881; and many articles on educational topics for the *Popular Science Monthly*. In 1878 Professor Clarke was chairman of the chemical section of the American Association for the Advancement of Science. He has also served as president of the Chemical Society of Washington.



"THIS GALLOWS YOU SHALL BE HANGED UPON, O SANDAL-MAKER OF BABYLON!"

THE SANDAL-MAKER OF BABYLON.

BY WILL CARLETON.

HE was rather a picturesque old man, upon a pettily complex plan,
With grim ability, never hid, to superintend what others did,
And state—an effort's race being run—how things that were done should have been done.
Nought e'er was made but he could tell how he could have made it twice as well;
Nought e'er destroyed but he would bet that he could have smashed it finer yet.
And this erratum of mankind sat, all day, a moral and mental cat,
And threw the claws of his intellect at every merit and defect,
And into the palace and the cot, and into what men were and were not,
And into the deeds they struggled through, and into the things they failed to do,
Using the most uncalled-for cares with other people and their affairs,
And viewed with a supercilious smile the work of the world; and made, meanwhile,
The poorest sandals under the sun—the sandal-maker of Babylon.

No one was ever, since earth began, religious enough to please this man;
No one to the gods e'er bowed a knee that could have done it as low as he;
The tower of Belus itself, he thought, if men had builded it as they ought,
Had been much pleasanter to the eye, and several hundred times as high.
He knew just how it came to pass that Nebuchadnezzar was fed with grass:
Could he have only had his way, the monarch's feed should have been of hay.
In fact, no person, high or low, had fault to conceal or merit to show,
But he could figure it to a notch, and hold it up for the world to watch.
And yet, withal, his moral gait was that of a deep old reprobate,
Full of foolish actions shrewdly done—the sandal-maker of Babylon.

No man was better able to tell how dead men might be living and well.
He knew the parts of the human frame, and every organ he called by name.
A theory of his own had he that man wasn't made as he ought to be;
Could have creation by him been done, the job would have been a better one.
No ill to mankind ever came but he had remedies for the same,
But never a word about them said until the suffering man was dead.
And yet, in spite of his mental wealth, he never had any kind of health;
The sickliest creature under the sun was the sandal-maker of Babylon.

You'd think, to hear him talk, that he invented money itself. He'd see
The gone-by chances of every trade—how every bargain should *have* been made.
He'd tell the rich why they were so; the poor, why they were not; could show
How even the king's great national purse might have been managed better or worse.
Yet had he one financial lack: he might be kicked to Susa and back,
And not a coin of any shape from his habiliments would escape:
Wealth always had contrived to shun the sandal-maker of Babylon.

But he began, unlucky elf, at criticising the king himself;
And so his head, as one might say, endangered even itself one day;
For soon the king, with a humorous sense, requested of him an audience;
And said, "I have heard you cannot live beneath such government as I give:
There's no necessity for the same, and no one but ourselves to blame.
So, sage of the lapstone, do not grieve; I will give you every chance to leave:
This gallows you shall be hanged upon, O sandal-maker of Babylon!"

The engine of death the old man scanned, and murmured, in accents soft and bland,
"Well, hang, if it does you any good; but I want it expressly understood
That were this gallows made by me, a deadlier weapon it would be.
I go to the other world: no doubt things over there need straightening out."

The monarch laughed, and lightly said, "You'd be a nuisance, alive or dead.
Go back to your stall and pound away, and think your thinkings and say your say."
"A foolish plan you have hit upon," said the sandal-maker of Babylon.

And never again the old man staid one happy day at his double trade.
"I do not like to retain my head by anybody's permit," he said.
"If king were I and I the king, I wouldn't have spared him for anything."
And slow and surely, day by day, he lost his vigor and pined away.
They found him lying dead alone—sad sandal-maker of Babylon.

And even now throughout this earth (I tell the story for what 'tis worth)
They say his restless spirit runs, and makes its home with various ones.
Few families are so happy they have not a visit from him some day;
Few towns so blessed with fortune's smile that he doesn't live there for a while.
He will find fault till earth is done—crank sandal-maker of Babylon.

BETWEEN THE LINES.*

BY CAPTAIN CHARLES KING, U.S.A.,

AUTHOR OF "A WAR-TIME WOOING."

XXIV.

BAD news travels fast. Long before the Major could reach the western entrance to the Pass, the assistant surgeon had ridden along the eastern base of the range from the camp of the cavalry out post at Thoro'fare, and in answer to an almost imperious demand from Lucy, had falteringly told her of the discovery of "Tierney's" real name and identity, and then was compelled to admit that the order had been issued for his immediate execution. He expected an outburst of womanish tears, possibly hysterics and wild lamentations, but he could have spared himself that anxiety.

"It is confirmation of my father's fears and mine," she said. Her face was bloodless, her lips quivering and almost bluish in hue, as though bitterly cold; her glorious eyes were tearless now, but dark circles had formed about them, and their gaze was hard and stern. "Monstrous and murderous as the decree may seem to us, I presume it is useless to appeal to your commander for mercy," she presently continued. "You are sure Colonel Westerlo had returned, and had seen him?" and for an instant there was almost piteous appeal in the look she gave him, and in the tones of her voice.

"Yes, Miss Armistead; he was closeted with the old colonel a full hour before I came away, and I grieve to say we heard of no change in the order. Still, I beg you not to abandon hope."

"Hope!" and a flush of indignation rose for a moment to her wan cheek. "What have we to hope from men like him? At least, I presume he will not refuse me one last word with my brother, or, if I come too late for that, the poor privilege of bringing home and burying here—all that is left to us?"

"I feel sure he would not; but—forgive me—I fear it may be now too late."

"You do not mean—you cannot mean that they would have killed him already!" she exclaimed, with horror in her face. "Oh, this is monstrous! this is worse than tyranny!"

"I hope not. I pray not," answered the doctor, hastily. "But when I left it was the understanding that it was to occur soon after sunrise, and if—if you were able to ride over—"

"I will go instantly—instantly. Meantime you will stay with my father, will you not? Colonel Westerlo gave me to hope that you could remain here throughout the day.",

"Depend upon me, Miss Armistead; I haved uties here with Captain Wise's detachment that will detain me until the morrow, and I can spend most of the time at your father's side. First, can I be of any aid in getting your horse? My orderly is here."

"No, no! Come at once to father. Say nothing to him of my going. Conceal from him, if you can, the possibility of my brother's fate, and if he awake and discover my absence and demand the reason, then let him understand I have gone in hopes of saving him. Father was awake all night, and has only within the hour fallen asleep exhausted."

"And you have a horse?"

"None; but Colonel Westerlo left some instructions with Captain Wise, and he will surely let me have one. My habit and saddle are left; our horses were taken long ago."

And so, almost at the hour when Major Kearny set forth from camp, Lucy Armistead, mounted on a spare horse of Captain Wise's, and escorted by that gentleman himself, rode westward up the Pass, and was soon across the range. Wise had been summoned from his early breakfast by a message from the guard, saying "the young lady" wished to see him at once. His half-hour's talk with Colonel Westerlo the previous day had filled his soul with sympathy and sorrow for the unhappy occupants of the homestead, and Miss Armistead's beauty had long since undermined the soldier sternness with which he had entered upon his duties. He obeyed her summons with alacrity, but was aghast at sight of her white, quivering face and trembling hands. She was exerting every effort to preserve her self-control, but the struggle was painfully apparent. In few words she told him almost coldly of her brother's death-warrant, and begged that she might have a horse to ride over into the valley and down to Van Duzen's head-quarters. There might be time for one last appeal, or for a few words of farewell. Wise never hesitated a minute. Miss Armistead should have the best horse in his squadron, and he himself would escort her. Captain Wise added, below his breath, "Court-martial be blowed; I can't stand this!" Miss Armistead assured him she needed no escort; but he knew better, and when she would have declined it, he told her he was sorry to force his company upon her, but as his orders were to allow none of the inmates of the homestead to get beyond his lines, he must make those lines as elastic as possible by going with her himself. In twenty minutes she was in her riding-habit and the saddle; had printed one kiss upon her sleeping father's forehead, breathed one brief prayer to God for divine protection and guidance, and then rode past the pickets with her cavalry escort at her horse's heels, the admiration of every soldier of the guard.

They had not reached the village of Hopewell when, thundering up the rocky road, his horse all foam, there came suddenly into sight a horseman in the Union blue. Miss Armistead had been urging the pace at every practicable "stretch" of the winding passage through the range, and her sad eyes were gazing eagerly ahead as they turned a shoulder of the heights to their left. She reined in, however, the moment this solitary rider came in view, and if Wise had not been looking at him instead of at her, he would have noted how her pale cheek began to glow the instant the expression of her eyes changed from mingled surprise, incredulity, and hope to undoubted relief and joy. The next instant the tall horseman had trotted up, whirled his steed to the left about, and was at her side, bowing with cavalier grace over the pommel of his saddle, and baring his close-cropped head as he saluted her. Wise, riding on her right, noted the gold leaf on the cavalry strap, and made up his mind that this could be no other than the Major Kearny of whom he had heard so much. She had turned away from her escort to greet the new-comer, and her face was for the moment hidden from him; but the instant he heard her voice responding to the major's salutation, the captain concluded it his duty to fall back and give a word of instruction to the brace of troopers who followed them. Before he could carry out his intention, without being too abrupt, he heard her almost breathless inquiry for Henry, and Kearny's deep-toned answer:

"Reprieved, and probably safe. Something told me you would hear the contrary, and I came at once."

For a moment she could make no reply. She bent forward over her horse's neck, covering her eyes with her slender hand in its worn old riding-glove. Kearny leaned toward her, his eyes yearning over her, his arm half outstretched as though eager to catch and support her should she sway or reel. No word was audibly spoken in the next minute, but Wise could see in half a glance that Kearny's lips were moving, and that he was murmuring something intended probably for her ears alone. The three horses were ambling peacefully abreast, glad of the chance of a breathing spell, and Wise glanced over his shoulder at the troopers in the rear and concluded that now was his time. He reined back, but she missed the click of the hoofs on her right, rallied in an instant, and brushing the tears from her eyes, raised her head and called him.

"You gentlemen have not met before?" she asked. "Major Kearny, let me present Captain Wise, who has been very, very kind to us to-day."

And Kearny drew back his panting steed, and extended a gauntleted hand to the captain over the croup of her horse. Wise remembered the force of that grip for weeks afterward. Again he would have retired and yielded his place to his senior officer, but again it was she who interposed. The road was wide enough for three now that they were fairly out of the Gap, and she would not hear of his going. Wise looked uneasily at the major, but could read nothing in his impassive face. Kearny plainly saw that, the first emotion and excitement over, and her anxiety as to Henry's fate measurably allayed, she was again mistress of herself and of the situation. She did not mean to be alone with him to the exclusion of any other man, and he was as proud as she.

He was worn and jaded from his all-night ride and his hours of vigil and sleeplessness. He would give her no hint of the pains and labor he had undergone in Henry's behalf and on her account. He somewhat bitterly said to himself it was a matter she would not care to know, and he never dreamed, as he rode in moody silence by her side, or spoke calmly and with simulated cheerfulness of his confidence in her brother's transfer from the hands of the fiery Van Duzen, that down in the bottom of her sorrowing and tender heart she well knew he could not have been with the neighboring command on the previous day—indeed, had not Westerlo told them he was with his new regiment *en route* to Washington?—and that in some way he must have heard the news, and, like the knight he was, had hastened to the rescue and then to her side. Even in the anguish of her anxiety and dread there was a joy in this consciousness against which she strove in vain. What but love for her could have brought him here—here at her side? Gratitude and a sense of obligation might have hurried him forward to Henry's prison, but he would have stopped there, his work accomplished, had he not loved her and longed to bring her the tidings of the reprieve.

And yet no sign of this would she let him see. Was there not still *another* between them?

Late that afternoon brother and sister were seated in his guarded room, holding a few moments' converse while the captain was making preparations for her return. Not without difficulty had Westerlo and Kearny succeeded in obtaining for her the privilege of spending those intervening hours with the prisoner. "Old Van" was already beginning to repent him of his clemency, and to mourn what might be a lost opportunity. He had read of Southern women who furnished lovers or brothers with means of escape. What was to prevent her giving him poison with which to cheat the government of its punishment of the spy? Kearny clinched the matter and put an end to the argument by saying that he gave his word of honor that nothing of that kind would be attempted; and when Van Duzen looked dubious, he added brief mention of one or two Senatorial names, at which the Pennsylvanian surrendered. He was politician enough to know the influence of the Kearnys and the New Jersey delegation, and to yield gracefully in presence of such odds.

At one hour of the day Westerlo and Kearny were allowed to hold a consultation with the prisoner and his sorrowing sister. Ostensibly it was to confer with him as to his "last wishes," for, in the absence of instructions to the contrary, Van Duzen had announced that on the following day at sunset he must pay the penalty of his crime against the laws of war. In reality it was to comfort him and her with details of the rapidly growing sentiment in the entire command against his being regarded in any other light than that of an ordinary prisoner of war. Westerlo had taken pains to tell all over camp the story of Judge Armistead's possibly fatal illness, and the gallant effort made by his son to see him just once more. So, too, he had told how they had shielded and succored Major Kearny, and the stories grew as they went from man to man. By noon that day "the reb" was decidedly more popular in that particular camp than its commanding officer, and there was talk of starting a "round-robin" petition in behalf of the former. Then, too, at any moment now despatches might come from Colonel Graham or from Washington setting Van Duzen's edict aside. Kearny had long since sent a mounted man over to the military telegraph station with additional despatches, and orders to wait for replies, and he and Westerlo were in a feverish state of anxiety. Armistead alone was calm and composed.

At last it was time for her to go, for she felt that she must be with her father overnight. Wise, of course, had turned back one of his troopers at Hopewell to tell the doctor of the reprieve, but she well knew the dread anxiety night would bring to the failing old man. The officer of the guard and a sentry, as required by their orders, still stood at the open doorway of the prison room, but the two field-officers withdrew that the brother and sister might have a few moments of whispered confidences. Her horse had been resaddled, and now, with those of Captain Wise and his orderly, was in readiness outside. Kearny's, too, was being led up and down in front of Westerlo's tent a short distance away. He had determined, despite his fatigue, to ride to Hopewell and spend the night at Wise's camp. It was a desire to see Judge Armistead once more, and strive to be of service to him, that would excuse this uninvited visit; but he longed inexpressibly for a few words with her. This was no time, he knew, to seek to undo her determination or to strive to discover whether her heart as well as her hand was pledged to this unknown rival. He had been strangely moved by what Westerlo let fall concerning Falconer. It was not possible that she, an Armistead, could deeply love a man whose courage was questioned, and whose name was mentioned with covert sneer. These were matters on which he could not speak to her, and yet what man who loved as he loved would abandon hope so long as there was left one tendril on which to cling?

And now 'twas full time they started, and old Westerlo had tiptoed into the dark hallway and tapped at the casing of the open door. None but he saw that parting. It was still some minutes before he could lead her away, and then, with bowed head and hidden face and faltering step, she came forth leaning on his strong arm. A group of a dozen officers stood not far away. Beyond them had gathered a number of the men; all curious, perhaps, but all silent and sympathetic. Some one of the former removed his forage cap, and in a moment every man in both groups stood uncovered. This was the Virginia girl who had saved Major Kearny's life. It was reason enough.

Westerlo lifted her into the saddle. Wise reined up on the other side. Kearny could be seen swinging astride his horse over at camp, and she was bending down saying a few words of thanks and tearful farewell to her stanch old friend, when there was a buzz of voices out toward the Thoro'fare road and the clatter of galloping hoofs. Kearny came trotting eagerly down to meet the arriving messenger, who suddenly darted into sight around a neighboring building and almost rode over the major before he could check his steed.

A joyous light flashed over the Jerseyman's face as he read the brief words of the despatch thrust into his hand, followed by a shade of disappointment. Quickly he rode to her side, and without a word handed her the paper. This was what she read—she cared nothing for the address or signature—she knew it must be true:

"Orders by telegraph direct Colonel Van Duzen to place the prisoner Armistead under your charge. You, with sufficient escort, to bring him at once to Washington."

XXV.

March and April have gone. So has Van Duzen's camp at White Plains. Stirring times have those cavalrymen been having on both sides of the Bull Run range, but little of it, outside of "Old Van's" Congressional district, did the people hear. Matters of far graver moment have been occurring farther south along the Rappahannock. Chancellorsville has been turned and lost. Stonewall Jackson has made his last triumphant attack in flank, and has led his enthusiastic Virginians for the last time. May has brought sunshine and cloudless skies and soft and perfumed breezes to the once lovely valley in front of Hopewell Gap, but the roads are all dusty again with the tramping hoofs of scouting dragoons, and all is wild excitement and whispered confidences among the people who still occupy the homes and cottages of Warrenton and the villages to the north. June is here before we realize it in the whirl of hurried raid and rapid marching, and the war-clouds are sweeping up the Rappahannock, up the Hazel River, and those tireless horsemen of Stuart lead the van and clear the way. Two strong divisions of blue jackets—our old friends of the —— New Jersey among them—cross the stream and boldly grapple the advancing columns, and at Beverly Ford and Brandy Station the troopers of the North and South clash in the first real cavalry battle of the war. But within another week the dingy gray jackets and plumed felt hats are riding jauntily as ever up toward Luray, and through every pass, one after another, the Union horse dash in to the attack. And still they stay not. With the end of the second week in June, Lee's advance is far down the Shenandoah, and miles and miles ahead of the Army of the Potomac on a race for the North. Another week, and as the Union columns pass over the well-known fields of the old battles, and trudge on up to Edwards Ferry, what should that bold raider Stuart do but double on his tracks, come back down the Luray Valley, camp once again around Salem and White Plains, and then, cutting loose from the entire army of his commander, circle completely around the rear of Hooker's marching columns, cutting off trains and stragglers at will, cross the broad river between Washington and its defenders, and then go galloping straight away for the Susquehanna? No wonder our Union dragoons are kept "on the jump"! No wonder Major Kearny finds his hands full in handling his new battalion! No wonder his heart turns with longing and anxiety to the old homestead at Hopewell Gap, and he prays for opportunity to ride over thither and satisfy himself as to her safety! He has not seen her; he has not heard one word from her since the night she left Van Duzen's camp to return to her father's bedside, while her brother remained—his prisoner.

He had faithfully carried out the instructions most reluctantly transmitted to him late that night by the irate and disappointed colonel. With an escort of a dozen troopers he had conveyed his friend and captive to the provost marshal's office at the capital. He had had one long talk with him on the way, not an entirely satisfactory one. There was an odd constraint in Armistead's manner which Kearny could not understand or account for, and which the former did not see fit to explain. They parted in Washington without removal of the veil, and the major went back to his regiment sad at heart and more restless than ever.

One thing, however, he accomplished as a religious duty. He lost no time in acquainting the authorities with Armistead's story, and in reminding them it was to his people he owed his life. He found where Armistead was to be confined, and wrote to his mother and other relatives in New Jersey, enjoining upon them that they should do everything in their power to repay through him the obligation owed to the Armistead family. The authorities offered to release the captain on parole, and the captain refused it. All *he* asked was that they should exchange him as soon as possible, and permit him to rejoin his squadron under Stuart. Kearny rode back to Virginia, and was presently hurried out to the front, and heard no more of his prisoner for many a long day; when he did, it was to be informed in several letters that came all at once that Captain Armistead had fretted himself into a fever; that he had been and still was seriously ill; that in his helpless condition the rules had been relaxed, and Mrs. Kearny and others had been permitted to have almost exclusive care of him in a comfortable room set apart for the purpose, and that he was now on the mend. About the week before he rode into the charge at Brandy Station, Major Kearny had other letters. Armistead had almost regained his strength after a long convalescence; and, "I once thought, Frank," wrote his mother, "that something more than a school boy and girl affair was going to be the result of your long association with Kate Paulding. Indeed, I was almost certain she thought so too, but I am bound to say that the present state of affairs is a puzzle to me. For the first month of his incarceration she seemed to avoid the possibility of going to see him with me or with your sisters. Now the days are few that do not find her ready to go and read to him by the hour."

It was a piece of information at which Kearny smiled.

But early in June there came a time when once again the fortunes of war seemed bearing him toward Hopewell. Despite the desperate fighting at Beverly Ford, Stuart had pushed on northward, using the Bull Run Mountains for his screen, and Kearny, with his battalion, had been held guarding the trains of the advancing Army of the Potomac. How he prayed for release from this humdrum duty, and longed to be with Gregg and Buford and McIntosh in the columns that had dashed off northward, along the familiar old range, in pursuit of the wily raider! Twice in person and several times in hurried letters he appealed for relief, and begged to be sent on to join the other command, but it was useless. His new regiment was comparatively undrilled, uninstructed, and the men had not shown the steadiness and cohesion of the older troops in the one day of desperate hand-to-hand fighting. The general decreed that they with others in like predicament must stay and guard the trains, and Kearny perforce had to stay with them. Time and again he wished himself back, a troop or squadron leader in the old regiment, but 'twas too late. Not until toward the 20th of the beautiful month of June did he find his white-topped charges slowly crawling into view of the Bull Run range, and one day he wrung reluctant permission from his senior to take half a dozen men and ride over toward the gaps to inquire for his friends. It was late in the afternoon when he trotted through the well-remembered hamlet of Gainesville, and out on the Thoro'fare pike. It was nearly sunset when he reached the Aldie road, and soon was plunged in the shadows of the heavily timbered range. It was twilight and still as the grave when he came in sight of Hopewell Gap and the dim cross-country trail to Sudley Springs. Far to the east the heights of Centreville were still bathed in rosy light, and the white walls gleamed in the last rays of the sun, invisible to him by reason of the barrier at the west. He remembered how Lucy's big Newfoundland used to trot out on the red road in front of the hedge, and challenge with deep-mouthed bark at the sound of advancing hoof-beats; but here he was in sight of the orchard and the heavy foliage of the old trees about the house. Behind him his men were chatting and laughing as they rode at ease, and still no sound of life came from the homestead. Something like a chill seemed to strike home to his

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* Begun in No. 1667.

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heart; something like dread presentiment overcame him. Unable to bear the suspense, he spurred rapidly forward, and in another moment was at the gateway, gazing with straining eyes and choking breath upon a scene of desolation.

There was the old piazza; there the tall brick chimney, still proof against wind or weather. There were the broad steps and the dingy white urns and the little squat pilasters of the blackened balustrade, but all else was a gaping ruin. The dear old homestead was gone.

For some moments the shock wellnigh unmanned him, but the presence of his escort, chatting in low tones, and speculating as to how and when and why this destruction had occurred, restored him to himself. Riding in on the ruined drive, he dismounted, sent a small party of his men up the Pass to watch for possible raiders from the western side of the range, where Stuart was known to be in force, and then began a sad search for anything that might give a clew to the mystery. When could this have happened? How did it take place? What has become of her and of her father? These were the questions that were uppermost in his mind.

The roof of the old portico was gone with the rest of the house, but the floor and the big white columns still stood. They were protected by the stone wall which formed the basement, though the columns were charred and blistered on the inner side. Within the rectangle formed by these stone basement walls was one yawning pit, half filled with heaped and blackened timbers. Over in the northwest corner, where was Aunt Bell's domain—the kitchen—were the remains of the big stove which she was wont to keep in such glistening coat of polish. Beyond that the trellis-work and the low fruit trees through which the sentry paced the night old Nelse found him "so busy" he "didn't like to disturb him," and so slipped out unseen. Beyond these the now abandoned hen-house and the gaping doorways of the old barn; but nowhere was there sign of life of any kind. Busy, scratching hens, neighing steeds, lounging troopers, watchful old house-dog, Nelse with his limping gait, Aunt Bell with her cheery black face, Hannah with her alert, intelligent, eager eyes, the patient, sad-featured old father—all were gone, and with them the girl he so fondly and faithfully loved.

Late that evening, heart-sick, and weighed down with anxiety, he was pushing eastward again to restore his escort to the command. With Stuart's troopers just across the range and likely to come through at any moment, it was no place to spend the night. Alone, he would gladly have remained until some tidings could be gained, but he was responsible for the safety of his little party, and stern duty demanded his prompt return. With an entire army straining every nerve to reach the Potomac and check a dangerous invasion, it was indeed

"No time for love or sighing,"

and though it wellnigh tore his heart, he had to go.

Splashing through the shallow waters of the Catharpin, his escort aroused some sleepy watches on the eastern bank, and sharp challenge greeted him. A patrol thrown out along the left flank of the army had halted for the double purpose of resting and watching the road to the Gap. The men were springing to horse as Kearny answered, and it was with difficulty he could persuade their commander that he and his were friends. A moment's parley, however, satisfied them as to his identity, and then the two officers dismounted for brief consultation.

"We were going to venture out early in the morning, and go as far as the Armistead place at the Gap," said the lieutenant, presently, "but some negroes in an old cabin here told us it was burned down six weeks ago."

"Where are they?" asked Kearny, with sudden interest.

"Just in the woods there at the edge of the clearing. One of them lived at the place."

A dim light was burning in among the trees. Thither strode the major, his heart thumping in his breast. In answer to his resounding knock the door was slowly opened, and a venerable kinky head peered forth.

"Nelse! old man! Don't you know me?" was the instant exclamation.

"Oh my lawd! Mars'r Kearny!" cried the negro in reply, and then tears and sobs choked his utterance. The poor old fellow broke completely down, and clinging to Kearny's outstretched hand, wept like a little child.

It was some time before he could tell his sad story. Dr. Loring had been restored to his friends and patients soon after Colonel Graham returned and relieved Van Duzen, but he came too late. Day by day the Judge seemed to sink lower and lower. The cavalry were withdrawn, falling back to Fairfax again, and the Rangers reappeared. Even the sight of the Confederate gray failed to rally the broken old man, and one stormy night, just before they heard the news of Chancellorsville, he passed quietly away. They buried him in the little church-yard down at Warrenton by the side of his wife, and thither Dr. Loring had escorted Lucy and Hannah, leaving old Nelse with Aunt Bell to take care of the homestead. One night, soon after they took the Judge's remains away, there came a dozen men on horseback. Some were in uniform, some were not, and they ransacked the house and drank up all the store of "apple-jack" that was left, and drove him and Aunt Bell out into the fields, and swore it was the last time that place should ever shelter a Yankee, and then they burned it to the ground. Did he know where Miss Lucy was now? No—only that she was with Dr. Loring's family, either at Warrenton or perhaps Orleans again. Did he know any of the men who fired the house? Only one of them—the gentleman that came to see the major with the officers once—Mars'r Tierney.

[TO BE CONTINUED.]

REAR-ADMIRAL CHANDLER.

The sudden death of Rear-Admiral Chandler, which occurred the 10th of February at Hong-Kong, on the Asiatic Station, of which he was in command, has removed from our navy a distinguished officer whose career had extended through two wars, and had included also a great variety of useful service in time of peace. Born in August, 1829, he was appointed to the navy September 27, 1845, from New York State, of which he was a native, and after passing some time at the Naval School, joined the flag-ship *Independence*, of the Pacific Squadron. The war with Mexico was then going on. He participated in the blockade and capture of Mazatlan, and in two skirmishes near by after its occupation by our naval forces. Then he was assigned to the *Vincennes*, in the same squadron.

In October, 1851, he was promoted to be Passed Midshipman, and after another short term at the Naval Academy, joined the *St. Louis*, of the Mediterranean Squadron, under Captain Ingraham, and took part in the Koszta affair. In 1855, after ten years of service, he was made a Master, and later in the same year a Lieutenant. His next duty was on the Coast Survey, where he distinguished himself and received the thanks of the Department for bringing the schooner *Crawford* safely out of a series of storms which she encountered off Cape Hatteras and endured for twenty-four days. The survey of the Parana and its affluents was amongst his work in this command.

When the civil war broke out, Lieutenant Chandler was serving on the *Vandalia*, in which he took part in the engagement off Port Royal, South Carolina. Transferred to the *San Jacinto*, he was in the attack on the Sewell's Point batteries and the capture of Norfolk in 1862, and while on this ship he received the thanks of the Department for his skilful recovery of the propeller that broke away from the shaft in the Bahama Channel, his method being preserved in drawings at the Naval Academy at Annapolis, used in lectures on seamanship. In July, 1862, he was made Lieutenant-Commander, and commanded in turn the *Huntsville*, the *Maumee*, the *Lenapee*, and the Monitor *Sangamon*. In the *Maumee* he participated in the bombardment and capture of Fort Fisher and the neighboring works used for the defence of Wilmington, and in the *Sangamon* performed the task of clearing the James River of torpedoes up to Richmond.

After the close of the war, while in command of the *Don*, he discovered and surveyed the Cultivator Shoal off Cape Cod. His commission as Commander came in July, 1866. In 1869 he commanded the *Tallapoosa*, and from 1870 to 1874 served as Executive Officer at the Brooklyn Navy-yard. In the latter year he was promoted to be Captain, and had command of the *Swatara* on the transit of Venus expedition, landing five parties, one each at the Desolation and Chatham islands and New Zealand, and two at Tasmania. His services in going to the Auckland Islands to aid the German party reported to be in distress there brought him warm thanks from Prince Bismarck. On his return to the United States he had command of the *Wabash*, and in 1884 became Commodore, and soon after was assigned as Commandant of the Brooklyn Navy-yard. In that duty he made many friends, who watched with interest his subsequent and final service in command of the Asiatic Station, to which he was appointed after his promotion to be Rear-Admiral, in October, 1886.

HALIFAX, NOVA SCOTIA.

Midway between the Strait of Canso and Cape Sable, on the southern coast of Nova Scotia, a peninsula makes out into the sea. To the east of it is Halifax Harbor and Bedford Basin, on the west is St. Margaret's Bay. This peninsula is the township of Halifax. The city is located on the eastern shore of a smaller peninsula of some 3000 acres, which is surrounded on three sides by water. The Citadel, a fortress mounting muzzle-loading Woolwich guns, crowns the hill about 250 feet above the sea-level, and overlooks the city, which lies along the shore for two or three miles.

Up to the time of the treaty of Aix-la-Chapelle in 1748, Annapolis Royal was the capital of Nova Scotia. It was there that the Governor or President of the Council chose twelve citizens from the town as a Council to aid him in making the laws, and to support him in the government of the country. It was in 1749 that the Lords of Trades and Plantations, who had charge of colonial affairs, determined that a new capital should be founded for the country. Accordingly Sir Edward Cornwallis was sent in the *Sphynx*, and arrived in Chebucto Harbor (now Halifax Harbor) on June 21st of the same year. Colonists to the number of 2500 followed him in transports. The hill-side on the west of the harbor was chosen for a site, a fort was built on the summit of what is now known as Citadel Hill, and the city was named Halifax, in honor of Lord Halifax, President of the Lords of Trades and Plantations.

In addition to being the capital of Nova Scotia, Halifax is the chief naval station of Great Britain in the Western Hemisphere, and contains an Admiralty House, the official residence of the Commander-in-chief of the North American and West Indian Squadrons. Here also is a navy-yard—The Queen's Dock-yard—where the ships of war refit. Two or three may usually be found in the harbor. During the Revolution in the United States and the War of 1812, Halifax was the scene of considerable military and naval activity. During the Civil War between the North and South, blockade runners were fitted out here, and brought back with them a great deal of money.

The city is laid out in an orderly way, the streets crossing each other at right angles. The business part of the town is between the Citadel and the bay, and here are found the hotels, the Halifax Club, the Parliament Building, the Provincial Building, the Government-House, Dalhousie College, and the Y. M. C. A. building. Looking toward the Citadel—one does this instinctively as toward the Capitol when in Washington—the Roman Catholic Cathedral of St. Mary's is seen to the left, on Spring Garden Street. Beyond it are the Artillery Barracks, on Sackville Street. The Public Gardens occupy the square at the junction of Tower Road and Spring Garden Street, and near them are the Convent of the Sacred Heart, the City Hospital, and the Blind Asylum.

About a half-mile from the shore is George Island, on which the government has a heavily armed fortress. This position is the key to the harbor, as its guns command every point of entry, even the Eastern Passage, through which the Confederate cruiser *Tallahassee* slipped away from the United States frigates one dark night at high tide. The outer harbor is guarded by the York redoubt and the batteries on McNab's Island.

The city has about 37,000 inhabitants, and, in view of its many commercial advantages, should be a wide-awake, bustling place. The West Indian shipments of molasses, sugar, and rum come here. Portland, Maine, for some years a winter port for Canada (the St. Lawrence being closed with ice), has been abandoned in favor of Halifax, but the formal weight of governmental importance has had a depressing effect on the mercantile activity of the city. For many years there has been a rivalry between Halifax and St. John, New Brunswick. Haliburton makes Sam Slick speak of it in *The Clockmaker*, not always to the advantage of the Haligonians. All about Halifax there are rich fields of coal and lumber, which could be made very productive if they were only developed; and when they are made productive, as they surely will be soon, Halifax will become a busy, bustling town, unless some more wide-awake place steps in and takes the place.

DR. HENRY C. YARROW.

No name in the medical register is better known to his countrymen at large than that of Dr. Henry C. Yarrow, of Washington. A Philadelphian by birth, he was graduated in the year of his maturity, 1861, at the medical department of the University of Pennsylvania, and went to the front at once as Assistant Surgeon of the Fifth Pennsylvania Cavalry. In 1862 he was transferred to the regular army as Acting Assistant Surgeon, and has continued to hold that office ever since. For the last three years of the war he was the executive officer, under Dr. John Neal, at the Broad and Cherry military hospital in Philadelphia. After peace was declared he saw service at Atlanta, Georgia, and at Fort Wood, in New York Harbor, during the prevalence of yellow-fever epidemics. Later he was assigned successively to Fort McHenry, near Baltimore, Fort Macon, North Carolina, and Charlotte, North Carolina, and in 1872 was appointed surgeon and naturalist to the Wheeler expedition for exploration west of the hundredth meridian. He remained with Colonel Wheeler's command till 1876, when he was ordered to the army hospital at Philadelphia, and at the close of the Centennial Exhibition was placed on duty at the Surgeon-General's office in Washington, to assist in the compilation of the index catalogue of the library there. For the last ten years he has been Curator of Herpetology in the National Museum, and for a part of that time Professor of Dermatology at the National Medical College.

Dr. Yarrow has lately retired from the presidency of the Cosmos Club of Washington. He was one of the first Americans ever admitted to membership of the Zoological Society of London, and he is connected with the French Association for the Advancement of Science, the Academy of Natural Sciences in Philadelphia, and several other learned societies. Outside of the strict lines of his professional practice his special interest is the study of the mortuary customs of all nations. He has published two papers on the customs of the North American Indians through the Bureau of Ethnology, and has another large volume ready for the printer; and he has accumulated the material for a history of medical practice among the aborigines. Professionally, some of his most notable work has been done in the investigation of antidotes for serpent venom. He is the author of the check list of reptiles of North America at present in use by most naturalists.

HENRY JACKSON HUNT.

Henry Jackson Hunt, Colonel United States Army (retired), died at the Soldiers' Home, Washington, D. C., on February 11th. He was born in Detroit, Michigan, September 14, 1819, and appointed in 1835 to the Military Academy from Ohio. He graduated in 1839, and was assigned as Second Lieutenant in the Second Artillery. Six years later, on the outbreak of the Mexican war, he was made First Lieutenant, and in 1847 became brevet Captain for gallant and meritorious conduct at the battle of Contreras and Cherubusco. At the battle of El Molino del Rey he was twice wounded, and at Chapultepec was made brevet Major for gallant conduct. He was at the capture of the city of Mexico. In 1852 he was assigned as Captain of the Second Artillery, and Major of the Fifth Artillery in 1861. He received the rank of Colonel later, and in 1862 was made a Brigadier-General of Volunteers for meritorious conduct. General Hunt was Chief of the Artillery of the Army of the Potomac, and at Gettysburg in 1863 won great renown in the most severe artillery contest of the war, if not of the world's history. Seven horses were shot under him in this battle, and for his services he was made a brevet Major-General of Volunteers. In the campaign preceding Lee's surrender he took a notable part, and received the rank of brevet Brigadier-General of the regular army, and later was made brevet Major-General. He was mustered out of the Volunteer service in 1866, and held posts in various parts of the country as Colonel of the Fifth Artillery. In 1883 he was retired with the rank of Colonel, his last active duty being the command of the Department of the South, at Newport Barracks, Kentucky. General Hunt was appointed Governor of the Soldiers' Home in Washington by President Cleveland in 1885, which post he held until his death.

General Hunt was an example of the sacrifice of military ambition to patriotism. He preferred to serve his country in a position where he could be of more service rather than seek promotion. He declined the command of a corps time and again, being persuaded by the then commander of the army to remain in command of the artillery. At the close of the war he showed himself the true soldier by accepting the command of a small post in Eastport, Maine, where his duty was performed with all the exactness and diligence that marked the commander of a hundred guns at Gettysburg. He was recognized by foreign countries as one of the first artillerists of the world, but political influences brought to bear upon his superior officers made his gallant career in two wars avail him nothing. A bill was passed by Congress after his retirement to raise him to the rank of Major-General, but for some reason it never received the signature of President Arthur, although the President was acquainted with the facts and justice of the case.

General Hunt's ancestry had a fine war record, as his grandfather and father were officers during the Revolutionary war and the war of 1812. General Hunt was a member of the Order of the Cincinnati, the Aztecs, and the Loyal Legion. His wife, who survives him with six children, was the daughter of Colonel Craig. His eldest son was one of the officers of the arctic relief ship *Rodgers*, and died, shortly after his return, from the effects of the voyage.

DR. JOHN CALL DALTON.

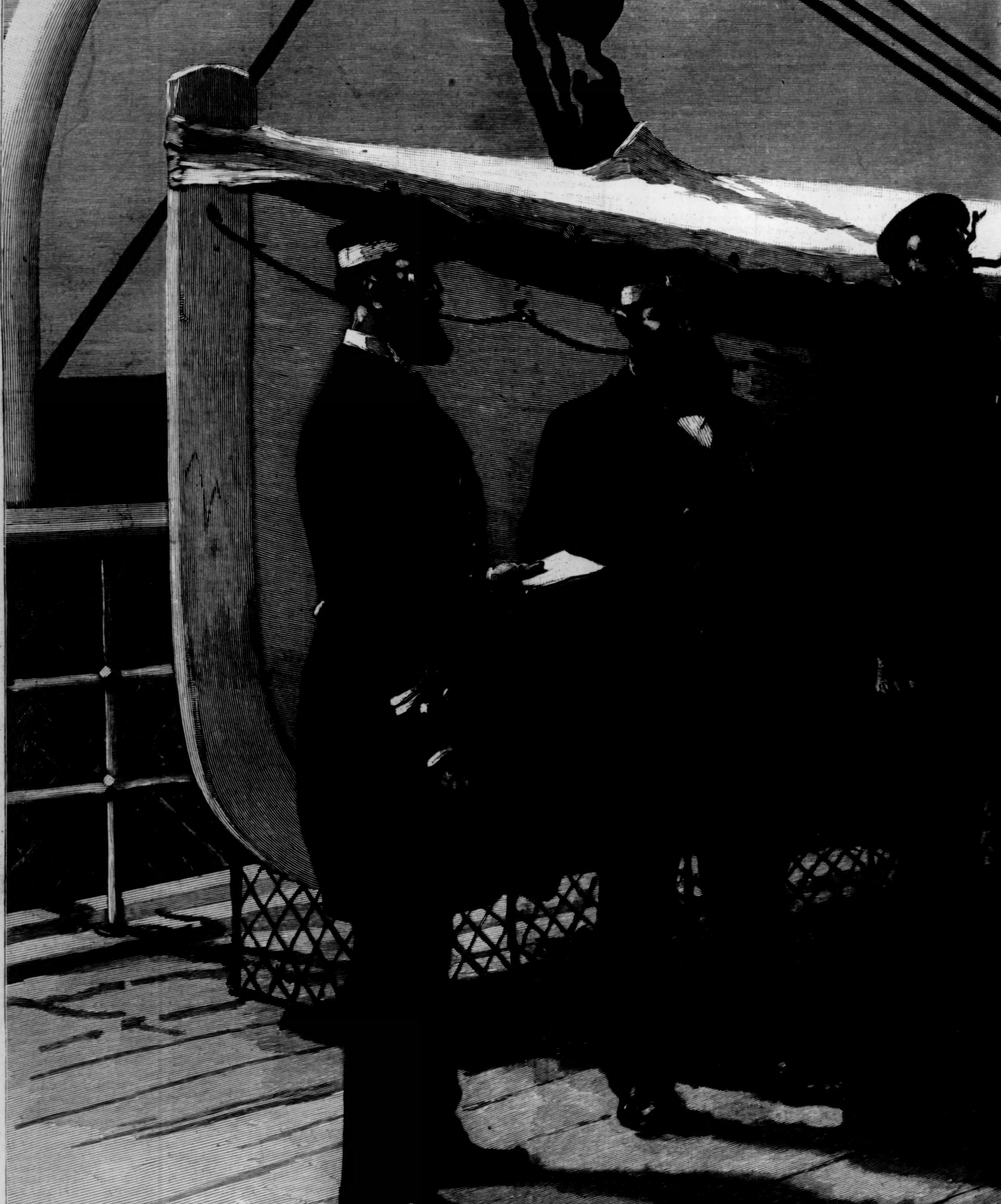
New York particularly, and medical science more generally, have sustained a loss in the death of Dr. John Call Dalton. Dr. Dalton, who had been suffering for some time from kidney trouble, died at his own residence, 56 West Fiftieth Street, on Tuesday morning, February 12th. The Doctor had reached the sixty-third year of his age.

Dr. Dalton was by birth a New-Englander, having been born in Chelmsford, Massachusetts, February 2, 1825. Of his early career little worthy of record is known, beyond that he found his way to Harvard University, where he graduated in arts in 1844, and in medicine, to which by way of preference he had given himself, in 1847. He was yet a very young man, but his tendencies were pronounced. His love of medical science, and particularly his taste for physiological investigation, were combined with strong and well-pronounced literary proclivities, and in 1851 he was awarded the prize offered by the American Medical Association for his essay entitled "Corpus Luteum." His success in this competition gave him immediate reputation, and he was soon after appointed Professor in the Medical Department in the University of Buffalo. This position he held until 1854, when he exchanged his chair at Buffalo for another covering the same branch of study in the Vermont Medical College at Burlington. During this period, both at Buffalo and at Burlington, he acquired notoriety by the prominence which he gave to vivisection in the illustration of his lectures. The notoriety was the more easily won that vivisection was somewhat of a novelty, and far from having popular approval.

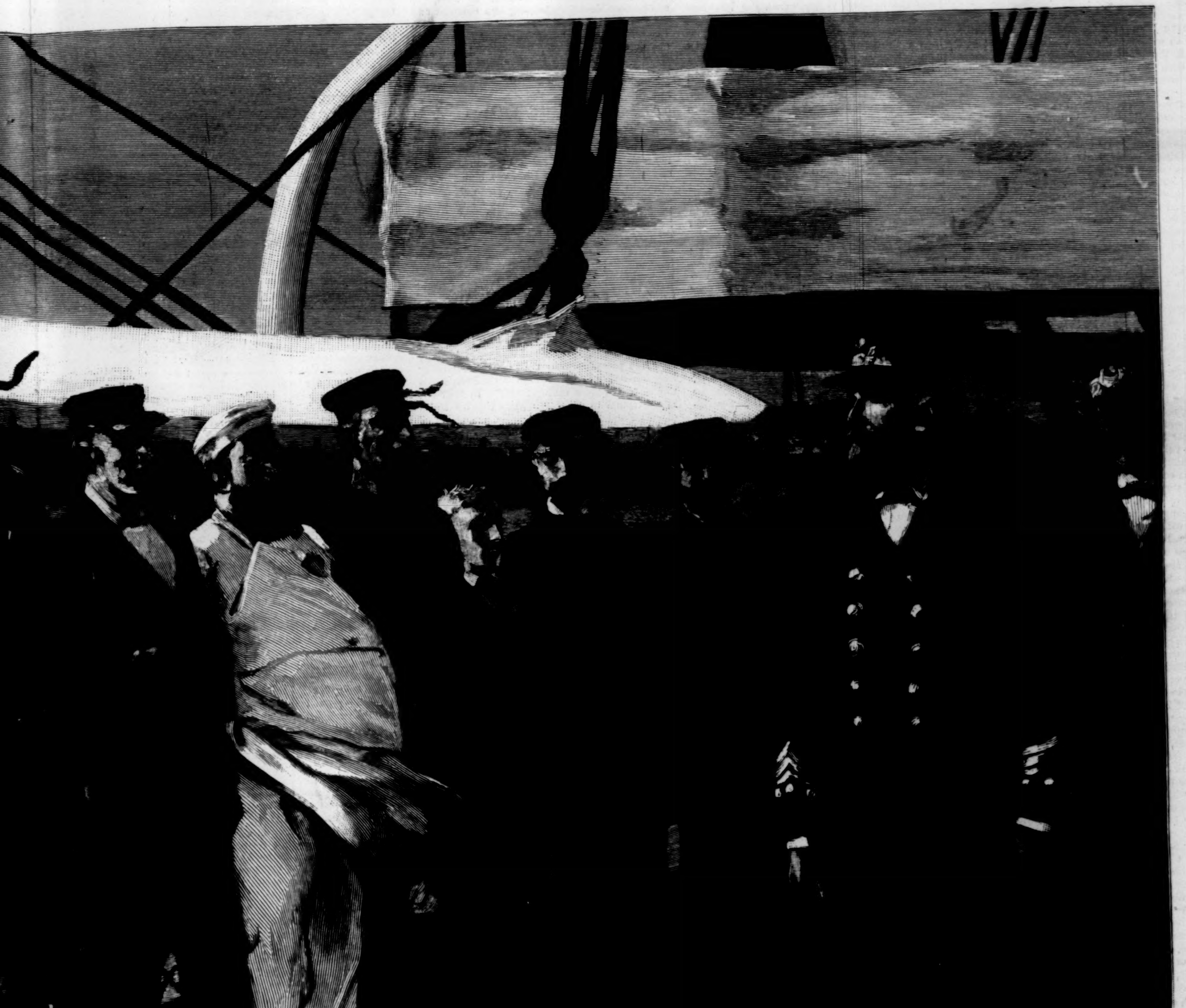
In 1856 the Doctor resigned his position in Vermont, and in 1859 we find him in the Chair of Physiology in the Long Island College Hospital, then just taking shape as a medical school. In this year he published his *Treatise on Human Physiology*, a work which had reached its seventh edition in 1882. In 1861 he went to Washington as surgeon of the Seventh Regiment, and in August of the same year he was appointed Brigade Surgeon of Volunteers, a post which he held until March, 1864. In the winter of 1864–5 he delivered a course of lectures on physiology, as substitute for Dr. Alonzo Clark, before the College of Physicians and Surgeons, and a little later he was appointed to the chair of Physiology in that college. This position he held until the time of his death. In 1868 he published a *Treatise on Physiology and Hygiene for Schools, Families, and Colleges* (Harper & Brothers).

He was Vice-President of the New York Academy of Medicine from 1874 to 1877. He was a member of the New York State Medical Society, the American Medical Association, the New York Society of Neurology and Electrology, the County Medical Society, the New York Pathological Society, the Medical Journal Association, and other organizations. In 1876 he was a delegate from the American Medical Association to the International Medical Congress in Philadelphia, and was president of the section on Biology.

His published works are numerous. Besides those mentioned, he was the author of *The Experimental Method of Medicine*, *Doctrines of the Circulation*, *Topographical Anatomy of the Brain*, *Physiology of the Cerebellum*, *Anatomy of the Placenta*, *Intestinal Digestion*, and other works. He made valuable contributions on favorite themes to the *American Cyclopædia*; and Johnson's *Universal Cyclopædia* of a later date contains many articles from his pen. In the medical and surgical magazines his well-known hand will be missed.


THULSTRUP - PARIS 86.

SUNDAY "BOATS' MUSTER" ON AN OCEAN


VII
BELLENGER

AN STEAMER.—Drawn by T. de Thulstrup.—[See Page 151.]

EIDOLON.

BY S. BAYARD DOD.

I HAVE been asked by my friend Albertus Minor to write an account of his invention; and I do it the more willingly because his labors have been directed toward the lessening of domestic cares. He has often said to me, "I would rather bring one ray of sunshine to the ingleside than construct a magnificent engine of war or of the workshop." But some will query, Is there room for another labor-saving domestic machine? Our houses are full of them, some of abiding value, others permanently useless. None can question that the sewing-machine and the wringer have come to stay, whatever view we take of the meat-hasher, the apple-parer, the potato-slicer, and the numberless machines which have turned the kitchen of our grandmothers into a gastronomic laboratory.

But all these are less than nothing, compared with the chimera that my friend has at last put into tangible form, after years of patient toil. Between us and all inventions for slicing our apples, hashing our meat, mangling our clothes, mashing our potatoes, and beating our eggs, there is interposed the inevitable servant-girl. She is the motive power of this complex array of domestic machinery, and, without her, these conveniences mock us with their possibilities. She is the problem whose solution is the pivotal question on which turns the peace of the fireside. What she is now, we know; what she shortly will become, none will be rash enough to prophesy. But we cannot get along without her; the shadow of her humors falls athwart the household, and the void created by her hasty taking off the whole family cannot fill.

To the solution of this problem my friend has given his whole thought and labor for the past twenty-five years. He did not purpose to repeat the unhappy experiment of Frankenstein, and tamper with hidden mysteries in the vain effort to create. This would not answer the purpose, even were it within the compass of human power. He was seeking to construct a machine endowed with power, only as his volition imparted it. Was not this as wild a chimera as the thought which called the Frankenstein monster into being? If it seem so, then listen to the story of its evolution. My friend has travelled all along the line in goodly company, for he has aimed not at the discovery of new principles, but merely at the application of accepted ones. He was therefore sure of his principles; he was simply pressing the wine out of the grapes which others had gathered. He is well read in the history of those efforts by which inventors have sought to impress matter with the permanent endowment of their ideas, to link man closer to his environment.

Nor was he without the support of good authority for this, for Leibnitz says: "It is only by what is within us that we have any knowledge of what is outside of us. We infer the existence of matter as the cause of certain sensations in the mind produced by certain qualities of matter. We know it as a resisting force not ourselves. But that this resisting force comes from mere dead and inert particles is a mere figment of the imagination, a crude and baseless hypothesis."

Here was high authority for his starting-point; matter was not, certainly, dead and inert. Nor have we discerned all the qualities of matter; and new forms of matter are rewarding investigation, almost every year. One of the most pregnant of the newer discoveries is the undulatory theory, the ocean waves giving us a norm by which to conceive and describe the motions of light, heat, sound, and electricity, and perhaps of the gray matter of the brain. Nor is this a mere hypothesis; there have been shown to the eye, graven on the wax cylinder of the phonograph, the captured forms of human speech, and, when you set the sympathetic diaphragm in motion, the wax will render back again the words which have been uttered by a voice now far away beyond the sea, or over the river which none recross. We had hung over this weird little instrument and heard the wizard, who had devised it, talk and sing and laugh to the plastic wax, and talk, song, and laughter came back to the ear, with every intonation perfect.

Returning to his workshop, Minor said to me, "Is this the end, or only the beginning?

"We know the law of complementary color—that if red be presented strongly to the retina and then withdrawn, a disk of green will appear, on a sheet of white paper presented to the eye, and so on for all the colors and their complementaries. Is not this true of sound, and all sensible impressions? There are induced currents of electricity, magnetism induced by electricity and electricity by magnetism; there is an echo for every sound, an angle of reflection for every ray of light, a reaction for every force. Is this also true of the brain, that its wave motion acts on nerve and muscle, and produces action, and thus, by speech, we call forth action in others? And if a diaphragm and a stylus and a cylinder of wax will serve as a substitute for the tympanum, litholites, and the harp of a thousand strings that constitute the human ear, then may not a system of diaphragms realize human action in a carefully constructed automaton?"

When I smiled at this, he pointed to the history of androidæ, to the moving tripods which Homer mentions, which, being loaded with viands, advanced of their own accord to the tables; to the statues of Dædalus, which, Plato says, were so active that they had to be chained to keep them from running away; to the clock which Haroun al Raschid presented to Charlemagne, with the twelve mounted knights, who performed their evolutions and then returned to the recesses of the clock. Three writers, and one of them a bishop, describe the eagle made by John Müller, which flew out to meet the Emperor Maximilian on his entry into Nuremberg, June 7, 1470, and returning, perched upon the city gate, and saluted the imperial visitor, expanding its wings and inclining its body. But the success which crowned the labors of the great Albertus Magnus kindled his enthusiasm, for he had constructed a man-servant who waited on his door and promptly admitted visitors on knocking. This man was of brass, and was the result of thirty years' hard work. He constructed it under various constellations, and it is said that when the sun was in certain signs of the zodiac the eyes of this image would melt metal on which the same zodiacal sign was traced. It was reputed to be gifted with powers of speech as well as motion, and to have revealed to Albertus Magnus some of his most important secrets. Unfortunately Saint Thomas Aquinas, Albertus's pupil, regarding the statue as the handiwork of the devil, one day, in his master's absence, attacked the defenceless creature and smashed it with a big stick.

Then there were various mechanical insects and birds—the iron fly which Regiomontanus made for Maximilian; the brass fly which Virgilius, Bishop of Naples, made to keep watch over the city: and it kept off other flies, so that the meat in the market-place was free from taint.

The facts regarding Roger Bacon's famous head are, unfortunately, clouded by the absence of its maker at the critical moment. But of Reysolius's statue we are told that "with the exception of the operations of the human soul, everything that takes place in the body may be witnessed." Leaving aside all further description of mechanical animals, as Vaucanson's duck and swan and Houdin's nightingale, we will merely catalogue the progress of invention as it has sought to imitate human action. There may be a reasonable doubt of Maelzel's famous chess-player, and the weight of testimony points to the conclusion that a boy was hidden in the automaton; but there is no question that the machinery of the figure enabled the hidden confederate to execute the moves. But Maelzel's trumpeter was a genuine automaton, which played not only Austrian and French cavalry marches and all the army signals, but also a march and an allegro, accompanied by a full orchestra. Still more wonderful was the success of M. Comus's group, constructed for Louis XIV., consisting of a coach and horses, with coachman and footman, and a lady inside. The coach drove up in front of the King, the footman handed the lady out, she advanced, and courtesying to the King, retired; the footman handed her into the coach, and being left behind, ran after the coach, and having overtaken it, mounted to his place. Vaucanson's flute-player played twelve airs, and was exhibited to the Royal Academy.

The next distinguished inventor in this line was the celebrated French magician Robert Houdin, who constructed the famous writing automaton, which executed drawings and wrote from dictation for Louis Philippe. Houdin thus describes the completion of his Sosia, as he called the android. "After many doubts as to the success of my enterprise, the solemn moment arrived when I should make the first trial of my writer. I had spent the whole day in giving the last touches to my automaton, which sat before me as if awaiting my orders and prepared to answer the questions I asked it. I had only to press the spring in order to enjoy the long-awaited result. My heart beat violently, and though I was alone, I trembled with emotion at the mere thought of this imposing trial. I had just laid the first sheet of paper before my writer and asked him the question, 'Who is the author of your being?' I pressed the spring and the clock-work began acting. I dared hardly breathe, through fear of disturbing the operation. The automaton bowed to me, and I could not refrain from smiling at it as my own son. But when I saw the eyes fix an attentive glance on the paper, when the arm, a few seconds before numb and lifeless, began to move and trace my signature in a firm handwriting, the tears started in my eyes, and I fervently thanked Heaven for granting me such success. . . . After making Sosia repeat my signature a thousand times, I gave it this question, 'What o'clock is it?' The automaton, writing in obedience to a clock, wrote, 'It is two in the morning.' This was a timely warning. I profited by it, and went straight to bed."

But in addition to these wonders of history, we were eye-witnesses of two remarkable inventions. Doubtless many who read this have heard Professor Faber's talking machine utter its broken English as Frau Faber played the keys, and remember the head, with a resonant nasal cavity, which was needed to give the pure Parisian accent.

This, however, was a mere curio of inventive art. But the steam man, exhibited some ten years ago in these parts, was in the line of serviceable invention. He was about eight feet high and of fair proportions, made of iron, with substantial feet, strong limbs and arms, and a broad, rosy face with a bovine expression. He was modelled as though in ordinary attire, with a blue swallow-tailed coat with buttons painted yellow; his waistcoat was red, and his hat was a stove-pipe, literally. The waistcoat formed the doors of the furnace, and underneath it was a fire of red-hot chestnut coal (which was the kind he preferred); the hat was the smoke-stack; in the chest was the boiler and steam-chest, down his legs ran the piston-rods; his hands were attached to the shafts of a barrow holding about half a ton of coal. When steam was turned on, he stumped across the floor with a heavy, deliberate tread, but with a slight inclination to topple. But he pulled his load easily, and did his work with the fidelity of a machine, that has no will of its own.

The history of the manufacture of androidæ, ornamental and useful, guaranteed success if only a motive power could be found which would respond to acoustic influences. While on the search for this, Minor fell in with a pamphlet by John W. Keely, describing his new force. "My power-developing liberator," he says, "is a vibratory device embracing one hundred and forty octaves. According as the setting may be, I can develop a power, by vibrating on the air in one or more of my receivers, varying in energy from one thousand to ten thousand pounds per square inch." He bids us discard our old notions of power as developed from the expansion of steam when studying the *modus operandi* of his motor, and states that it is based solely on "sympathetic vibration."

"This relation of vibratory sympathy exists at a distance of twenty feet, as fully and as perfectly as such relation exists between a magnet and the bar of iron which from a distance it draws to itself. My liberator, which is a small device, capable of being carried about in the hand, is a perfect structure, absolutely certain in its action, weighs but fifty pounds, and costs less than five hundred dollars to construct." To this circular the certificate of two prominent engineers is as follows: "As the result of our observations, upon several occasions, of experiments by Mr. Keely in the generation of his 'etheric force,' and having examined in detail his 'liberator,'. . . and it having been conclusively shown that it contained nothing but atmospheric air at normal pressures, we have seen a force generated or liberated exerting an expansive energy of upwards of twenty thousand pounds per square inch, without other instrumentality in its production than the agitation of two or more tuning-forks." In 1887 Mr. Keely reports to his stockholders that a "series of subtle and delicate experiments, an account of which in detail it would be impracticable for me to portray understandingly, has so far led me to modify my work that hereafter the foundation of it will be vibratory sympathy. The new form of force discovered to me, for want of a better term, I designate Negative Attraction." His counsel adds: "Mr. Keely has undertaken to wrest from Nature one of her most subtle forces and harness it for man's bidding; in other words, to give to his fellow-men a costless motive power. Every fact and feature surrounding the case warrants the belief that, notwithstanding public scepticism and incredulity, his success will be complete, and his work the most conspicuous example in the process of inventive evolution of the survival of the fittest."

Minor welcomed this with enthusiasm. "Have we not long been told," he said, "by the physicists that one need only find the key-note of an iron bridge, and the persistent playing of this note and its harmonics will set the molecules of the enormous structure in such a state of rhythmic agitation as to bring it crashing down?" Here, he declared, was to be found the scientific explanation of table-moving, viz., the accumulated power of molecular action in the line of a sympathetic vibration. Perhaps, too, electric girls owe their superlative strength to the same principle, and are, after all, only animated Keely motors. But, without further prelude, I present my friend's account of his pursuit of this remarkable power:

"My first series of experiments was in the direction of sympathetic sounds. In confirmation of Mr. Keely's theory, I found that the free strings of the piano would respond as I sang a given note. I had therefore only to combine the mechanism of Houdin with the 'sympathetic vibratory' force of Keely, applying this by diaphragms constructed on the principles of complementary acoustics, and my idea was realized. I proceeded to investigate the congeries of complementary sounds. First, I observed the effect of certain remarks made to my fellow-men, and found that, by the use of certain tones of voice, irrespective of what I said, I could produce certain effects. With the utterance of the merest gibberish to those whom I chanced to meet on the street, I could, by a pleasing inflection, put them in a complaisant mood, and leave them with a smile on their faces, albeit somewhat dumfounded by my quaint dialect. I was much enlightened by an experiment upon a very intelligent dog, a collie, who had the ready appreciation of what was said to him that characterizes the breed. The question turned one evening on how much he understood of what was said to him. I argued that he understood only tones; the ladies indignantly maintained that he understood every word. I put the matter to test by opening upon him a volley of abuse in a bland tone; he came and looked fondly in my face, wagging his tail, while I told him that he was a bad, mean, abject, miserable, good-for-nothing cur, fit only for the company of a tramp or an organ-grinder. This was my second discovery, viz., that inflection and tone are prime factors in promoting complementary sounds and synchronous activity, through the excitation of the 'sympathetic vibratory' force. In confirmation of this I found that a small Skye terrier could be set howling, with an intensity of sympathetic vibration painful to hear, by a descending chromatic scale.

"My next discovery was that 'I' and 'you' were the primary complementary sounds. I had now constructed a rude android, and fitted him up with a liberator, and a diaphragm arranged to take up 'sympathetic vibrations'; and this was my first discovery after I had him tuned. It is needless to say with what delight I hailed this primal revelation of the law of complementary sounds. The sympathetic diaphragm of my rudimentary android responded 'U' when I shouted 'I.' This was surely in the right line; here was the physical demonstration of the metaphysical doctrine of the objective and subjective, or, as the Germans put it, the 'I' and the 'not I'; but my diaphragm was more in accordance with our grammatical conceptions when it responded 'U' instead of 'not I'; the fundamental principle of my diaphragm was certainly correct.

"My next discovery was even more startling. I found that by uttering, with change of tone or inflection, the same sounds I could produce in the diaphragm a motion correlative to my own volition. But why weary my reader with a minute detail of the process of research? These things have so absorbed me that I am prone to think that others will feel the same interest in the minutiæ that I do. But the world is all for results, and will leave the tiresome process to those who are charged with ministering to its wants. It is so with all modern inventions, and mine must share a like fate. How many of those who read the long cable message in the journals know or care how it was transmitted? How many who use the telegraph or telephone care whether the current is direct or induced, or whether there is any current at all? No more will the public care to know the inner structure of my machine, who know not the organs and functions of their own bodies. Suffice it to say that I threaded the labyrinth of sound, and the complements of uttered speech, and was able to take up in my android, and make him subject to the influence of, spoken words, on a principle similar to that which transmits your voice along the wire; and that the force which this sets in motion is, I presume, similar to the 'sympathetic vibratory force' of the Keely motor. And now let me state results without any more wearying detail.

"Following the example of my most illustrious predecessors, Friar Bacon and Albertus Magnus, I have constructed my Eidolon of brass. This makes him light, strong, elastic, durable; and he will not rust. He is also resonant, and capable of high polish, or he may be beaten, or have an antique finish, to suit the taste of the customer. If left unclad, he can be used as an ornamental statue when not in service, and is easily cleaned and polished, along with the andirons and fenders. He is also thoroughly demagnetized, and is not liable to be struck when working out on the lawn in a thunder-shower. My prejudices and the verdict of antiquity were both in favor of brass; it seemed appropriate to his destined sphere. I have now a machine simple, strong, and thoroughly effective for the ordinary light work of a man about the place, or of ordinary woman's work about the house; more docile than a Chinaman, ready at any hour of day or night. Its capability and intelligence are measured only by the limitations of the master or mistress of the household in these respects; its whole and sole function is obedience. I propose to form a stock company for the manufacture of this article, under the name of the Eidolon Manufacturing Company (Limited).

"In order to introduce my invention to the public, I had proposed to hire out the one which I have made; but I abandoned this idea, when I considered the injury to which he would be liable by having his diaphragm untuned, by the influence of persons of varied dispositions. I find that he is very sensitive to this kind of derangement, and can discover the reflex of my yesterday's mood lingering in the diaphragms of my Eidolon. If I could have felt indignation at a thing so manifestly innocent, void of the powers by which intention and feeling are formed and expressed; I could sometimes have beaten my Eidolon, for he was like a recording angel making entries to my discredit. When I saw the stale passion of yesterday, which had burned itself out in a moment, and was gone where the smoke of yesterday's fire goes, recalled, and I was brought face to face with the ugly feeling, looking very mean and paltry, in the cold light of the next day and under other circumstances, then I was wroth with my tormentor. In order to tune him up to a responsive state, I had to talk in a pleasant tone, with soothing intonations, to this insensate thing, when, had I followed my bent, I would have drubbed him soundly; but this would have availed me nothing: I would simply have had to repair him. But there I was face to face with my own impatience or anger, and bound to smooth it away, or it would, by the inevitable law of reaction, so derange this miserable Eidolon that he would not work. I began to appreciate Frankenstein's plight: his was only ideal, mine was real. I accepted the doctrine of the total depravity of inanimate things. At such times I would long for the old régime, and wish that I had to deal with a living man who could act like a man, and not with this fool of an automaton, who could only hold in his pitiable diaphragms the impress of my moods and fling them back at me, with a persistency very much like the ill-tempered churl, cherishing revenge for a mere trifling affront of hasty words. This dispelled all thought of hiring him out. The only way was to build and tune each one for a special service. For, suppose my hired Eidolon to be subjected to the vibrations from three or four persons of discordant natures. As these varied dispositions wrought on his sensitive diaphragms, one soft and gentle, one harsh and rigorous, one slow and emphatic, another quick and imperative, one with a tone of persuasion, the other of sharp demand, how utterly the disposition of his diaphragms would be ruined, the vibrations so hopelessly confused that nothing short of complete reconstruction would put him in working order! The sympathetic vibrations and their synchronous reciprocity, on which I rely for his successful operation, would be hopelessly deranged, and I might be running the grave risk of having a demented automaton set loose, with a vast power, running up into the higher octaves of the Keely etheric force, and this power so misdirected as to drive him to almost any excess of eccentric activity.

"No! infinitely better than this deranged android is our present system, with men and women, who cannot afford to resent our humors, and though subjected to the capricious whims of a dozen masters or mistresses, each with a dozen moods (this would make one hundred and forty-four unsympathetic vibrations in my Eidolon), yet they are bound to submit and not treasure up our small whims of passion or petulance and hold them on record against us; we would not tolerate it. I trust that no one will be intimidated by the representation I have given. You can, by two minutes of insinuating talk, efface the lingering impression of a good ten minutes of round abuse; and you have this advantage — you have only yourself to deal with, your own humors to stand; and these are easy to forgive. And you have a grand moral opportunity in this Eidolon; for the poet's wish is near realized; it will the

> 'giftie gie us
> To see oursels as others see us.'

There you are to-day as you left yourself yesterday. If a first-rate artist would model you a likeness of yourself, and you will have the head executed in one of those life-like, grimacious, flexible gutta-percha faces, and will set this on your Eidolon, give him a cast-off suit of clothes and your last season's hat, I can vouch for it that you will feel that the old German superstition of a doppelgänger was the prophetic instinct of the eighteenth century foreshadowing what the nineteenth was to realize.

"I may be pardoned this digression, for I have worked so long at this problem, and it has been fruitful in the field of physics, metaphysics, and ethics; it has started so many questions, and suggested so many possibilities, that I want others to realize something of its scope. I propose to manufacture two types, following the grand division of the human race, because the world has made this the basis of division of labor, into man's sphere and woman's sphere. I propose, therefore, to make two kinds, the Eidolon and the Eidola. Naturally the public will expect the Eidola to be the cheaper, but this I cannot promise. They will require less material, it is true, but the adjustment must be more delicate, and I fear that they will be more easily put out of order, and hence need more constant repair. Their appearance, too, will have to be considered, and they will need a higher finish, with more refined and delicate movement. For example, I have placed on my sample Eidolon a mere semblance of a head, with not even a mouth (for he is not designed to answer back), and upon this block head I have put an old soft felt hat, pulled down low, so as to conceal his features, or rather the absence of all feature. This I was obliged to do as a concession to the prejudices of my neighbors, and to prevent my front yard from becoming the counterpart of the vacant spaces around the tent of a country circus. When my Eidolon first appeared, headless, at the tail of my lawn-mower, there was an assembly of urchins in five minutes, as though some dragons' teeth had been sown broadcast and waited only for this to vivify them. They were an ill-assorted rabble, and stoned my Eidolon. There was also a convention of the dogs of the neighborhood, who passed a set of howling resolutions against this innovation. I found, too, that the milkman, grocer, butcher, were unable to get their horses into the yard while my headless Eidolon was at work. I became an object of suspicion to the credulous, and all sorts of vague stories were afloat, and so I found it necessary, as a means of protection against a doubtful kind of notoriety, to put a head on my Eidolon. I recognize that a more imperative demand will be made for a properly headed Eidola. I can picture the dismay of a party of ladies calling at the house, and as they hear approaching footsteps along the hall, and, as the door opens, turn to inquire whether the lady is at home, find themselves confronted with a headless waiting-maid. However faultless her attire and demure her manner, all would not atone for the lack of the usual upper terminus of the human species, superfluous as it is from a mere utilitarian point of view. It is a mere prejudice, I know, and yet even prejudice, when it is so wide-spread and deeply rooted as this, must be accorded some concession. In order to tune my Eidolons to the particular person and service for which they are destined, I must issue a circular, and will, if furnished with a photograph, endeavor to consult the wishes of my patrons as to their personal appearance. The Eidolons will be five feet three inches high, the Eidolas four feet nine inches. I find greater height objectionable, as it gives one an abject feeling to be obliged to look up to one of these machines; and yet one should not look down on them; and there is something quite as elfish in the dwarf, as there is weird in the gigantic Eidolons. I have selected an average height, but 'rayther under,' as Dame Dorothy would say.

"For my own protection, as well as for the satisfaction of my customers, a circular of inquiry, touching the character of service, etc., seems necessary. If it seems like an impertinent inquisition, then I beg my patrons to look on it (as I shall the answers) merely as a matter of business, which, if requested, I will also regard as strictly confidential.

"CIRCULAR TO THE PATRONS OF THE EIDOLON COMPANY (LIMITED).

"(*Confidential.*)

"What is your age?

"Your occupation?

"Are you accustomed to the direction and control of inferiors?

"What is your general disposition toward them? To wit:

"Contempt for their humors?

"Do they make you nervous?

"Do you regard them as having the same feelings as yourself, or as a different species altogether?

"Do you take account of your own states of mind and feeling, in judging of your mutual relations?

"Do you expect very prompt obedience, or do you prefer a slow, deferential manner?

"Are you quick in temper and speech?

"Do you raise your voice when provoked?

"Is your natural tone soft and low, or harsh and high-pitched?

"Do you require unremitting toil from your subordinates?

"Do you give them a fixed time for recreation?

"What proportion does this bear to their hours of work?

"Have you any children? If so, are they mischievous; and how are they taught to regard the servants of the house?

"What special service do you require of this machine?

"How many hours a day must it work?

"What finish do you prefer, high polish or beaten brass?

"Note.—Customers will please state whether they wish an Eidolon or an Eidola; and if the latter, note any special preference as to style of dress. Caps and aprons, if required, must be provided by the purchaser, as we cannot furnish articles needing to be laundered.

"*Nota Bene.—Caution.*—We would warn our customers in regard to giving the Eidolas charge of a baby-carriage in the street. They can be recommended for this in that they are unable to gossip on street corners, but they have no discretion in regard to passing vehicles; and, moreover, the crying of a child, which does not stir the placid disposition of the human nurse-girl, might start the diaphragms of an Eidola, and send it off on an indefinite ramble. Parties who put them to this service must do so at their own risk.

"This company is liable for breakage or destruction caused by the Eidolas when in discharge of the stipulated service and when they are properly spoken to, but not if they are addressed in a violent tone of voice.

"The capital stock of the company is fixed at fifteen million shares of the par value of Ten Dollars each. The first million shares will be issued to subscribers at ten cents each, thus offering to investors one of the most promising ventures of this promising age. The second million shares will be sold at twenty cents each, and the third at forty cents, and so on, doubling the price at each successive issue, thus enabling each series of shareholders to realize one hundred per cent. on his stock simply by holding it. It is hoped that investors will see, by this open and candid statement, the enormous advantage of an early investment.

"Applications for stock, or for machines, may be made to the Eidolon Co. (Limited)."

This is the account of my friend's long years of toil; his success must be measured by those who try his Eidolons; I have done my mite in preparing this account for the press.

BOATS' MUSTER AT SEA.

In these days of ingenious marine inventions it is inexcusable if a ship be sent to sea unfurnished with the best of those life-saving appliances which modern ingenuity has produced. Nevertheless, it unfortunately does very often happen that when a shipwreck occurs a score of contrivances for life-saving which ought to be on board are wanting. Sometimes it is the boats that are at fault—perhaps they are stowed bottom up, or hang in badly working davits—and the ship sinks before they can be cleared and got over the side.

Things are nowadays better ordered on the great transatlantic liners, on the best of which the crews are periodically drilled in handling the ship's boats, in watering and provisioning them, and in preserving their seaworthiness as structures liable to be required at any hour of the day or night for immediate use. In some lines the men are mustered and sent through their fire and boat drill on the morning of the day before leaving England. The men assemble to the shrill cry of the boatswain's whistle, the watches are called, and then all are told off to their respective stations. This is called the captain's muster. An hour later the whole crew are again mustered, put through their drill, and piped down. The ship is then inspected and steam ordered. Then there is fire and boat drill once at sea during the voyage, when the chief officer sees that the men are at their stations, and reports the fact to the captain. The pumps are tried, and the third officer takes his station on the main-deck and sees that the hands are at their places there by the water-tight doors. The crew are then told off to their respective boats, and after the chief officer has noted that the men are in their proper places, several of the boats are swung out and in. One can see, from the promptness with which each man springs to his post at the boatswain's hoarse command, how custom would be sure to prevail and form the deeply needed discipline in time of danger.

In the distribution of the boats, in case of having to abandon the ship, the captain takes No. 1 starboard life-boat, the four mates have charge of other boats and cutters, and the boatswain, carpenter, and quartermasters take command of the remainder. Everybody knows his own boat, for a register of boat stations is kept, with the names of the crew of each boat. There can be no confusion in that respect at least. The instructions are exceedingly simple in case of leaving the ship. It is the duty of the officers to see their respective boats ready for lowering, and to guard against any one entering or attempting to lower a boat without the captain's personal order. Then the surgeon, chief steward, cooks, chief waiter, baker, and butcher get water and provisions ready, and see that each boat is victualled. The duty of procuring compasses, nautical instruments, lamps, blue lights, and rockets rests with the officers in command of the boats. The water breakers are always kept ready filled, each officer seeing to his boat in this respect. The water is renewed at least once a week. The life-boats are all fitted with two air-tight galvanized iron tanks, in which all necessary provisions may be stored. They generally pull ten oars double banked, and under every man's seat there is hung a life-belt formed of cork.

One who witnesses this drill at sea cannot fail to be impressed by it. It is not a little reassuring when the eye seeks the wide ocean, and the mind thinks of the crowds of human beings on board ship, to mark the man-of-war-like discipline that these plain merchant sailors fall so easily into, to observe the swiftness with which they swing out each large and powerful life-boat over the side clear to its falls, and to listen to the furious gushing of the thick streams of water from the hose, ready in a breath to be pointed to a flame the instant it is discovered.

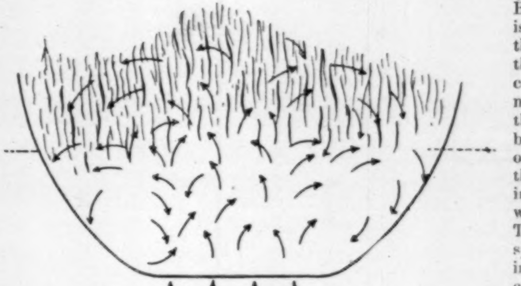
A REVOLUTION IN IRON AND STEEL MANUFACTURE.

In the development of the manufacture of products of iron ore, Sir **Henry Bessemer** failed to achieve what he set out to do; but in the course of his experiments he made so valuable a discovery that his original purpose was abandoned. His effort was to discover a mechanical method of doing the work now done by the hands of the puddler. His achievement was the discovery of a mechanical process for the making of a new product, which has, more than any other modern invention, laid broad the basis for the material advancement of modern civilization. Now a process of manufacture discovered in France, and recently perfected at Springfield, Ohio, has led to the solution of the problem that **Bessemer** undertook. But as far as Sir **Henry Bessemer** fell short of inventing a mechanical puddler, so far has this newly discovered process gone beyond that task. The result will be a revolution in the manufacture of all products of iron ore, and another great cheapening and consequent extension of the uses of iron and steel.

To understand the commercial value of this new process, it is necessary to describe briefly the chief processes of iron and steel manufacture now in use.

Pure iron, it must be remembered, is found only in meteors, and is not known in the mechanical arts. The most nearly pure iron that is used is a high grade of wrought-iron. The impurities that are present in wrought or bar iron cause it, in the process of rolling, to have a fibrous structure. If carbon be present in the iron, it is then known as steel. If the percentage of carbon is very low—less than one-half of one per cent.—it is "mild steel," which will not temper, and is very ductile and tough. This grade of steel is used for the making of boilers, wire, and the like. If a greater per cent. of carbon be added, and the metal be homogeneous in structure, with carbon evenly distributed, it becomes steel. In order to make wrought-iron, the silicon and carbon must be removed from the metal which flows from the blast furnace; and if steel be the product desired, then either only a portion of the carbon must be removed, or, after the iron has been entirely decarbonized, carbon must be added in such a quantity as will yield the desired product. This—to decarbonize the pig-iron—has been the problem which the iron-masters have been seeking to solve for the last three centuries. To the English we owe all the improvements that have hitherto been made.

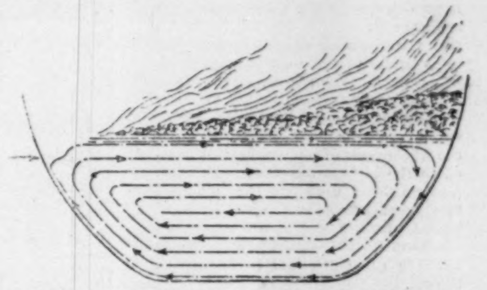
The first real advance was the process known as "puddling," invented by Mr. **Henry Cort** about 1781. He heated pig-iron in a furnace so constructed that the air passed over the iron, while the puddler, standing in front of the furnace with his long puddling bar, kept the mass in constant agitation and exposed all parts of the iron to the action of the oxygen in the air, which, coming in contact with the iron, united with the silicon and carbon and burned them out. The mechanical impurities, being lighter than the iron, floated on the surface. When the process had continued for a sufficient time to burn out all the carbon and silicon, the charge was drawn off and run into ingots. When heated, these bars were passed through a series of rollers which shaped the iron to the forms demanded by commerce. The puddling furnace has been improved, but no invention has yet replaced the puddler, and all the wrought or bar iron to-day is purified by the muscle of the puddler. This was the task that **Bessemer** set out to do—to invent a mechanical substitute for the puddler, whereby a larger and cheaper product could be made.



THE ACTION OF THE AIR IN THE BESSEMER CONVERTER.

Although the invention of the **Bessemer** process, which makes the low grade of steel known as **Bessemer** steel, opened up a new field for utilizing iron products, it left the process of making wrought or bar iron precisely where it was before. And these iron products are yet made by this essentially ancient method, and by hand. The puddler stands in front of the furnace, and with his long rod stirs the molten metal; and it is not only slow manual labor, but the most exhausting, perhaps, that any class of mechanics do. A puddler's life is short, for, as an iron-manufacturer has described his labor, "he stands continually at the door of hell." The product of a puddler and his helper is about a ton per day; and all wrought or bar iron is made in this slow and consequently expensive fashion.

As the discoveries of the puddling process marked one great era in the manufacture of iron, the substitution of the mechanical for the manual purification of iron by Sir **Henry Bessemer**, in 1855, marked another. While the thousand and one uses for iron developed by inventions, such as railroads, machinery of all kinds, and the use of pipes for gas and water, were taxing the capacity of the furnaces, Sir **Henry Bessemer**, in seeking a mechanical process of doing what the puddler was doing by hand, produced a metal which was unknown before—a metal of low grade which could be rolled into shape; and, while it could not be used in the forge of the smith, nor used for the manufacture of tools, was harder than iron, and was quickly adopted for railroad uses.



THE ACTION OF THE AIR IN A ROBERT CONVERTER.

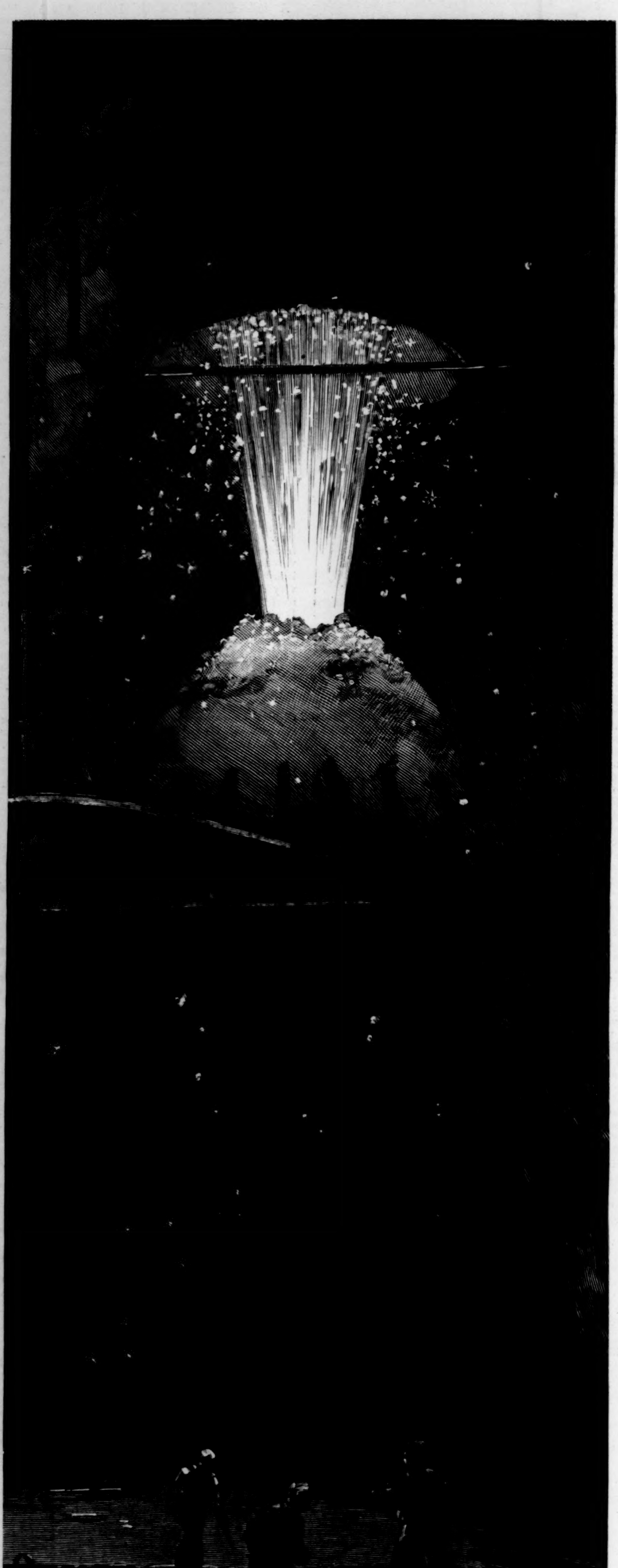
The three great advantages of the **Bessemer** steel are: that it can be produced by the same number of men in vastly larger quantities than puddled iron; that the product is peculiarly suited for such purposes as railroad iron—for, costing to-day twenty-eight dollars a ton, it will last five times as long as railway iron costing thirty-five dollars a ton, and a **Bessemer** steel ship plate is both harder and stronger than one of iron; and that fewer laborers and less skill are required to make a ton of **Bessemer** steel than to puddle a ton of iron, the labor cost of making the steel being less than one-third that of making iron. To this day, however, all the finer grades of steel, such as are used for tools, have to be made in crucibles. The iron must be heated in a closed crucible holding from fifty to one hundred pounds of metal and the required amount of carbon added. This process is so expensive that tool steel sells at from six to twenty cents a pound, according to quality. Tool steel is yet so costly that its uses are limited.

Such are the chief processes of iron and steel manufacture; and the great problem which Sir **Henry Bessemer** attacked had remained unsolved, when, about a year ago, a Frenchman, **Gustave L. Robert**, of Stenay, France, made some experiments which were the starting-point of the new process, and the news of his experiments came to the ears of J. W. **Bookwalter**, the manufacturer, at Springfield, Ohio. When he heard of this discovery, Mr. **Bookwalter** immediately went to see **Robert**'s experiments, and he secured the right to the process in the United States. Returning to his factory in Springfield, he built an experimental plant, and improved and expanded upon the idea of the inventor. After twelve months of experimenting he has perfected the invention, and within a month or two his first patent has been issued. The process is so simple that every iron-worker will wonder that he did not discover it long ago. It can be best explained by comparing it with the **Bessemer** process. The peculiarity and the defect of the **Bessemer** process is that the air is blown perpendicularly through the mass of iron, as shown in the illustration, keeping it in constant agitation, and therefore mixing all the impurities with the iron. If the current of air be blown long enough to burn out all the silicon and carbon, the oxygen will also attack the iron, and the resulting product will be a weak and oxidized iron. To remedy this, the **Bessemer** system introduces some ore of iron, such as ferro-manganese, containing a large amount of carbon; and a certain amount of this peculiar ore is necessary to be used with the common ore to produce the **Bessemer** product. The illustration shows the **Bessemer** converter blowing the air from below the mass of iron. In the new converter, on the other hand, the blast is over the edge of the iron, horizontally, and produces a rotary motion in the metal, causing a most violent agitation, which presents every portion of the metal to the blast, and at the same time blows the slag and other impurities which are floating on the surface to the farther side of the converter. It will be seen that this converter is simply a mechanical means of doing exactly what the puddler does by hand, turning the iron over and over, and presenting all parts of the molten mass to the air, and exposing only a small portion of it at a time to the action of the blast. So long as there is any silicon in that part of the metal exposed to the blast, the oxygen will attack neither the iron nor the carbon; and so long as there is carbon the oxygen will not attack the iron. By the new process all the silicon, and practically all the carbon, can be burned out of the iron; or only the silicon may be burned out and the carbon left, and the impurities removed by gathering them on the surface of the molten metal, leaving steel when the blast is stopped.

Thus, by the new process, every grade of iron can be made, from the purest wrought-iron to the highly carbonated steel. It covers the whole catalogue of products of iron ore. The new process is like the Bessemer process in this—no fuel is necessary in converting the melted cast-iron into the finished product, which by the Bessemer process is Bessemer steel, and by the new process is any grade of iron or steel that may be desired, whether metal for machine bolts or metal to be made into surgeons' tools. The development of the Bessemer process has prepared the way for this new process. The perfection of the converter, and of the blast machinery, and all those appliances which distinguish the Bessemer works of to-day from the early ones, are necessary in the new process. The marvellous feat of mechanical engineering which was hardly a less noteworthy achievement of Sir Henry Bessemer than the discovery of his process itself, is as useful to the new process as to his. A Bessemer converter weighs, with its contents, from twenty to thirty tons, and it is moved by a gentle effort, and it receives a blast so powerful that the whole mass of molten metal is heated to the highest temperature that has hitherto been used in the practical mechanical arts. In the materials of its manufacture, and in the appliances for its manipulation, the new converter has the same essential necessities as the old.

Since the metal which comes from the Robert converter can be a pure iron, a low or mild steel, or a steel high in carbon, from this converter can be poured every grade of metal that is used by the smith or a rolling-mill. And this range of metal includes iron that is now made by the puddling process, which is the iron used by the smith and manufactured by the rolling-mill into all forms of bar and sheet iron; the steel now made by the Bessemer converter, which is used for railroad iron, for iron beams and girders for buildings, for ship-building and all forms of massive iron; the mild steel, which is used for boilers and those processes requiring a soft and tough steel, and a crucible steel, from which are made the tools and all the finer products of the mechanic. This means that every grade of iron or steel that has hitherto been used for railroad bars and ship plates can now be produced by the same method; and that all products of the ore may be produced by a mechanical process, and so cheaply as to give a greater stimulus to the use of iron and steel than any previous invention. Since the blast of air in the Robert process does not support the enormous mass of iron as in the Bessemer process, the blast is vastly less, and the entire plant, including engines and all the necessary machinery for the production of 100 tons a day of any grade of iron or steel, can be built for less than $10,000, or one-third the cost of the Bessemer plant of the same capacity. The tuyeres of a Bessemer converter must be renewed after fifteen blasts. The tuyeres of the new last for 250 blasts. The Bessemer converter must be relined after a very few blasts; the Robert after 1000 blasts. By the new process the metal is heated much hotter than by the Bessemer process, and is therefore much more fluid; but this quality, added to the freedom from impurities, enables the new converter to pour the metal directly into the billet which is to be rolled into the desired form, whereas the Bessemer product is so impure that it is cast first into a 14-inch ingot, and then "broken down," as it is called, being rolled through a succession of rolls which reduce the ingot to four inches square. The new system makes possible the saving of about four dollars a ton in the making of the billet.

The cost of making all grades of iron or steel is the same by the Robert system, and that cost is less than the cost of making Bessemer steel. The significance of this will be appreciated when it is realized that the poorest grade of iron costs from four to six dollars a ton more than Bessemer steel, and the highest grade of tool steel costs several hundred dollars a ton, or more. Not only are all these products, which are already made by other methods, produced cheaper and more rapidly by the new process, but a class of products can be made which it has hitherto been impossible to make. From the converter the metal can be poured into moulds, and castings can be made which have all the properties of wrought-iron. They can be bent, hammered, welded, and in all respects treated as if they were the product of the forge and not of the foundry. This means a revolution in the building of machinery. Wrought-iron is five to seven times as strong as the best cast-iron. If, therefore, any piece of machinery requiring strength be cast of metal purified by the new converter, it can be one-fifth the present weight and of equal strength; or, if made of the present weight, of more than five times the present strength. There have been numerous attempts to increase the strength of castings, and to make what are known as malleable castings. The most successful has been the process of annealing. But this process has thus far failed in producing, for instance, heavy ordnance. If a highly carbonized metal from the new converter be cast, and the casting be permitted to cool slowly, it will be a soft steel, and part of which can then be tempered to any degree of hardness desired. The advantages of this are very great in the manufacture of such products as car wheels and heavy ordnance.



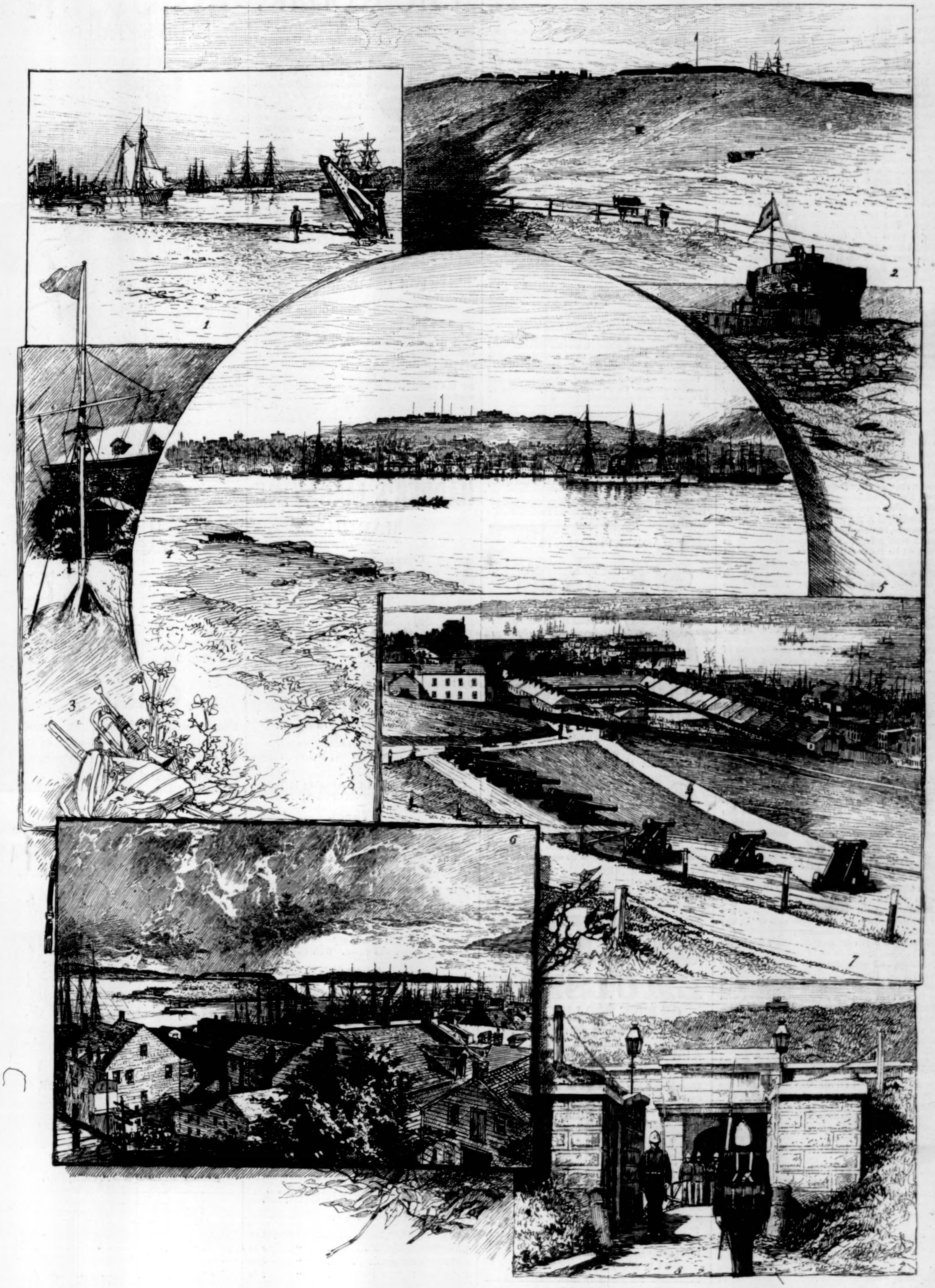
A BESSEMER STEEL CONVERTER.

The present manufacturers of steel and iron can utilize nearly all their present plants—all except the puddling furnace—when they adopt the new system. The greater part of most of the existing manufacturing plants is as necessary for the new process as for the old ones; and the additional machinery required is not costly in comparison with the cost of Bessemer converters. The method whereby the new process will probably be introduced in the United States will be by the granting of licenses to manufacturers to use it, paying a royalty to the patentee (the royalty received by Sir Henry Bessemer, by-the-way, amounted, ten years ago, to more than a million pounds sterling).

Although the patent on the new converter was granted for the United States now nearly a month ago, and for nearly a year the widest range of iron and steel products ever made at one place have been made in the iron-works at Springfield, no description of the process has hitherto been published. Many of the iron and steel manufacturers have applied for licenses to use it, and it is likely to be adopted in making those products that are now most costly with as great rapidity as the new converters can conveniently be put up by those who will have the liberty to use them. But it will not at once supersede the old processes. The slowness with which even a revolutionizing discovery is adopted is astounding evidence of the quality that in the year of a Presidential election we hear called the "conservation of business." The Bessemer process was patented in the United States in 1856, but it was not until 1866 that the manufacture of Bessemer steel became a very important industry here. A long time was spent in making improvements and in litigation and in organization. Since the patent has expired, the product has been larger than it was before. The Robert process has been patented in England, and the Italian government has bought the right to use it, chiefly to make heavy ordnance.

We have so accustomed ourselves to think of the various methods of producing iron and steel as each an independent industry (as indeed it is) that the simplification of these industries which seems obliged to follow the introduction of this process seems astounding. It is of universal application, and the products of it include all the products of all the old processes; and it is not unreasonable to suppose that new products will be discovered by reason of it—at least new combinations of products. One such new combination of products will be a car wheel as tough as a piece of forged iron at the centre, giving far greater strength than any ever made, with a rim of hardened steel to resist wear—made by casting the wheel of steel and tempering the rim. This unification of so many processes is one of the most remarkable simplifications in mechanics.

In considering the possible effects of a great reduction of the cost of producing nearly all the products of iron ore, it is interesting to glance at the extension of iron and steel that has been made, especially in the United States, within the lifetime of this generation, by reason of the cheaper processes developed since the Bessemer discovery; and not one of these processes, except the Bessemer, can be compared with this new process. Of course the Bessemer rail made our railway development possible; and it is our railway development that has made us the largest consumers of iron and steel *per capita* in the world; for the railroads consume at least half the total iron and steel product. But iron and steel bridge building, iron pipes for water and gas and steam, iron stoves, iron fences, iron ornamental work, iron ships, and iron agricultural implements are a few of the most important uses to which we have put the products of iron since the cheap modern methods of manufacture were developed. When a very much cheaper process than any now used shall have been adopted, the uses that will suggest themselves, and the advance that we shall make in many mechanical ways, cannot be conjectured. The cheapening of iron and steel more than any other development makes the difference between our civilization and the civilization of the Middle Ages. This is the physical basis of modern material development in every direction. In 1788, for example, the total production of pig-iron in Great Britain was about 68,000 tons. Less than a century later, one year's production (1880) was nearly 7,750,000 tons. This difference measures accurately the difference between the industries of the England of the last century and the England of this century; and a similar increase, of course, has been made in all civilized nations.



THE DEFENCES OF HALIFAX, NOVA SCOTIA.—DRAWN BY SCHELL AND HOGAN.—[SEE PAGE 147.]

1. Naval Station, from her Majesty's Dock-Yard. 2. The Citadel, from the Rear. 3. Admiralty House. 4. The Citadel and Front of the City, from Sandy Point. 5. Martello Tower, York Redoubt. 6. Fort Clarence, St. George's Island, and MacNab's Island. 7. Quarters for Married Men of Royal Artillery and Royal Engineers. 8. Sally-Port of Citadel.

MONEY AND INVESTMENT.

The difficulties that attend the making of safe investments have been very painfully demonstrated by the developments in the railroad world during the last few months. The causes underlying those developments have been patent to a good many people, but it is exceedingly doubtful if they have been appreciated as keenly by investors as they have been by railroad managers and by speculators. The investor is slower both in his decisions and actions than the two classes referred to. He has not the incentive to make a turn in the market that continually inspires the speculator, nor has he the means of informing himself that is one of the advantages of a railroad officer. He is by the very nature of his relations to the property in which he is interested removed, as a rule, from two very important scenes of action—the property itself and the place where the securities predicated upon it are dealt in. Information of changes affecting the value of his particular security comes to him slowly. The fact that the daily press, or at least certain parts of it, fairly teems with so-called railroad news affords him but slight satisfaction. Nine times out of ten it is not intelligible to him as it stands, since it may be simply an incident in a comprehensive movement the scope of which is not suggested by what he reads, or it may be that it is sadly perverted in the interest of subtle speculators. Besides, the average investor is tenacious of his securities, especially if they have yielded him an uninterrupted and satisfactory income. His habits are fixed, and he is averse to changes. To his mind they involve new risks, besides the annoyance and expense of transferring his funds from one security to another.

Strange as the statement may seem, the investor himself is largely responsible for the condition of affairs that has recently impaired the value of a very large and important group of securities. Those he has held have served him so well that he has, if anything, rather over-invested in the securities of the roads that traverse the vast territory west and north of Chicago. He has, unwittingly in many cases, provided some of the money that has been used to build the Granger trunk lines in advance of the needs of the population. This over-building of railroads west of the Mississippi River, together with other and natural causes, has resulted in a tremendous shrinkage in both principal and income accounts. It seems to be fashionable now to inveigh against railroad managers as incompetent and dishonest. Beyond doubt a large proportion of the criticism is deserved. But the great army of small holders of railway securities must themselves accept the duty and the responsibilities that are clearly their own. What is wanted has been very aptly described as a more intelligent ownership of our railroad systems. As bearing upon this point, one of the most eminent corporation lawyers of this city remarked recently, in advising a client who felt that his rights in a corporation had been impaired, that he would not hold the stock of any corporation in which he was not either a director or of the counsel. The proposition seems to admit of very little debate that eternal vigilance is the price of a fortune as well as of liberty.

The prices of securities upon the Stock Exchange have begun, since the first of the year, to reflect a more hopeful feeling regarding the outlook for the transportation systems of the country. This is the natural result of a partial awakening of the holders of railroad securities to a sense of the power they possess, but which heretofore they have invariably allowed some one else to exercise for them. The alarm has been so thorough that there seem to be fair prospects that hereafter the real owners of our various corporations will contribute something of value to their management. Of course natural causes are at times supreme, but there is never an occasion when human agencies cannot modify their action to an extent. It is this modification that is wanted now, and it should be constantly supplied by the force which has the power to make it, and that force is in the stockholders.

It seems a very easy matter to buy a few bonds or a hundred shares or so of stock in the Stock Exchange, and generally quite as easy a matter to sell them. Upon a very large class of people the operation makes no impression, though it should do so, as even temporary ownership carries with it almost the same obligation as actual ownership. It seems desirable, therefore, that dealers of this class should submit to a certain amount of tuition. The educational process is slow, but it is well worth encouraging.

The week now closing has been one of a good deal of anxiety on the part of those interested in the management of railroads. The success of the efforts to place the great lines between the Mississippi River and the Rocky Mountains upon a permanently better basis has hung in the balance, but now such decided progress has been made that success seems assured. Some uneasiness regarding the current quarterly dividend of the Chicago, Burlington, and Quincy company has also been allayed, and the action of that company in maintaining the rate that it paid the last quarter may very properly be regarded as a guarantee of its intentions to keep the peace. There have been some irregularities in trunk-line rates, but they have not alarmed any one, as the neighbors of the offending roads have been prompt to direct the attention of the Inter-State Commerce Commission to the alleged violation of the law. The appeal to that body to prevent rate-cutting and its ability to stop it is one of the advantages it affords that railroad managers have been slow to appreciate. With the money markets of the world reflecting a plethora of funds, and our railroad properties seemingly recuperating from their last blow, the financial outlook is much improved, as compared with a very few months ago.

C. A.

New York, *Saturday*, *February* 16, 1889.

IDLENESS IS A DANGEROUS FAULT in the kidneys. When inactive they speedily fall into disrepair. Those obstinate and fatal maladies, Bright's disease and diabetes, ensue with terrible certainty upon the inaction of the organs affected. Catarrh of the bladder, enuresis, gravel, and strangury are also to be apprehended from a partial paralysis of the bladder, of which weakness and sluggishness are the causes. Hostetter's Stomach Bitters is a fine tonic and promoter of activity for the renal organs, and one which can be relied upon to afford them the requisite stimulus without exciting them—an effect to be feared from the unmedicated alcoholic excitant of commerce. A further beneficent effect of the Bitters, by renewing activity of the kidneys, is to enable them to drain from the blood, in its passage through them, impurities productive of rheumatism and dropsy. Nervousness, fever and ague, constipation and dyspepsia are conquered by the Bitters.—[*Adv.*]

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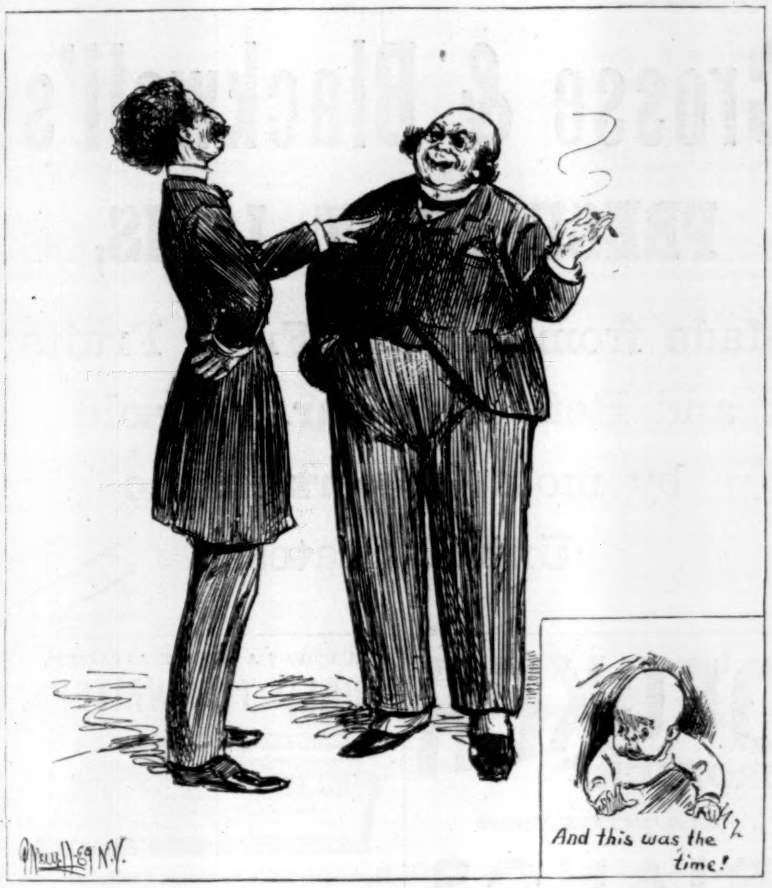
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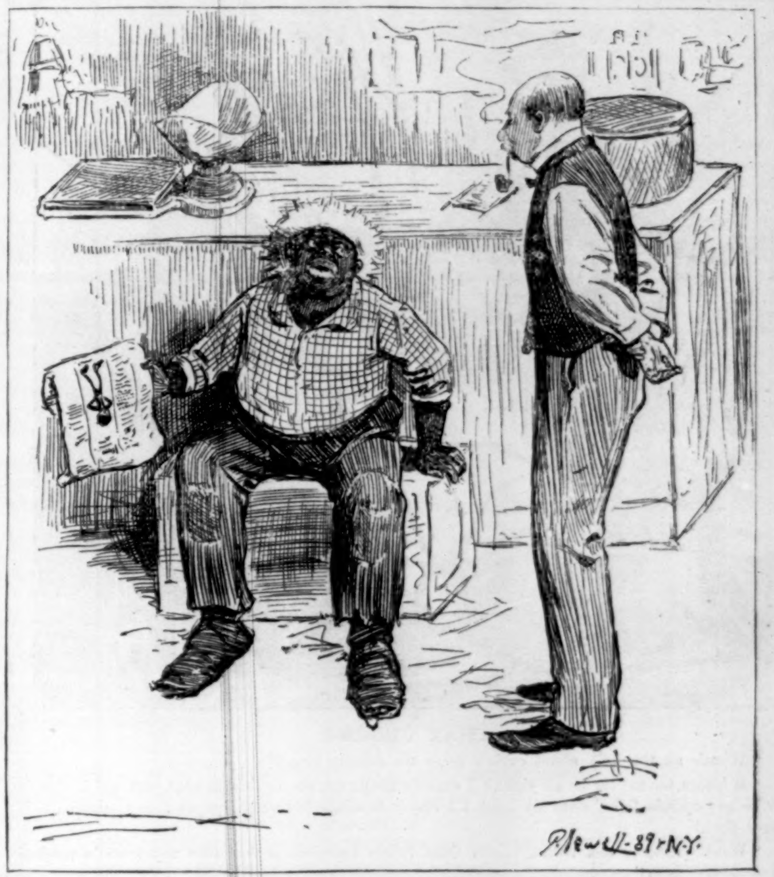

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"Dis heah artikle 'bout dat man walkin' on de ceilin'."
"Turn the paper 'round an' let me see't. Why, you've got it upside down!"

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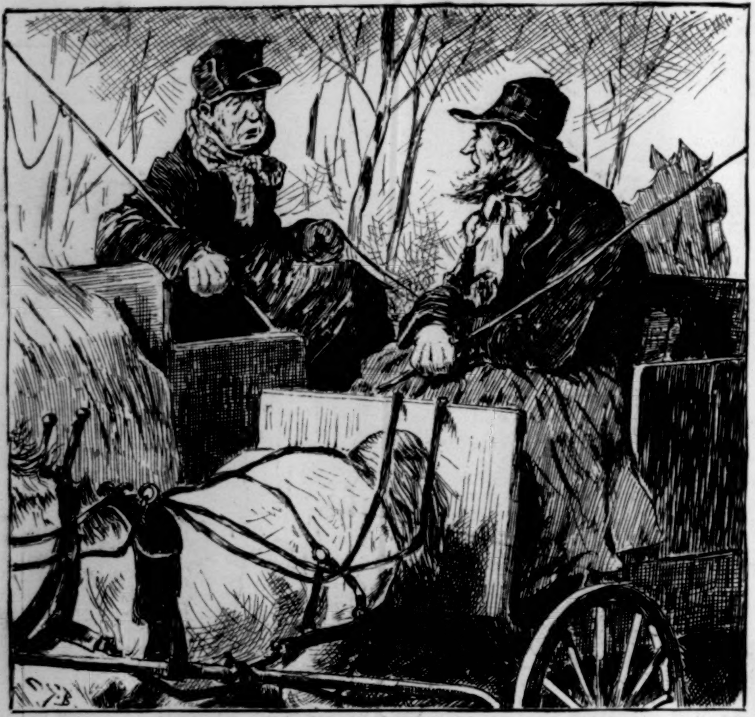

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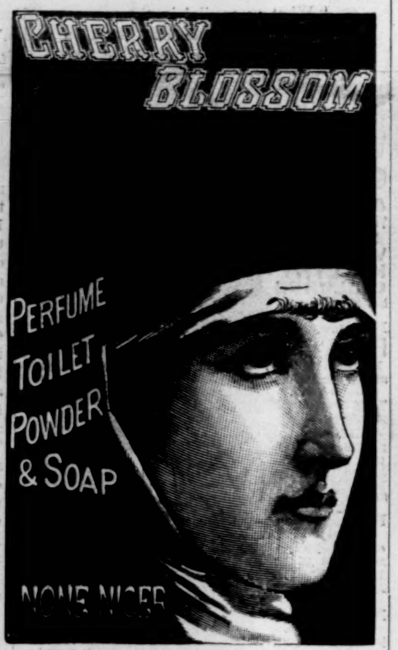

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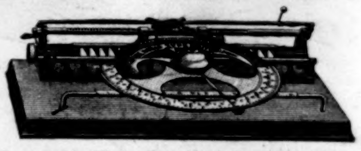

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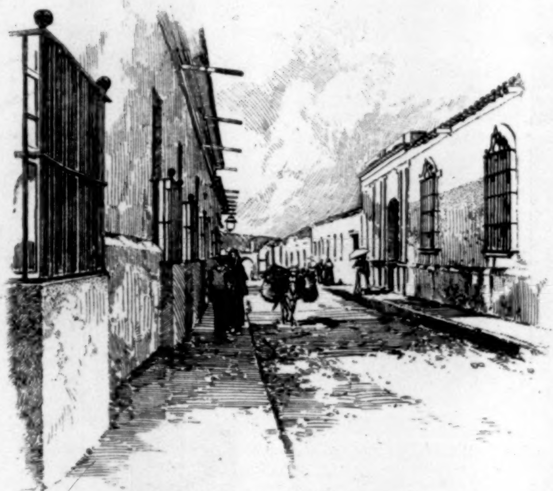
"MORAL: INSURE IN THE TRAVELERS."

ALONG THE RIO GRANDE.

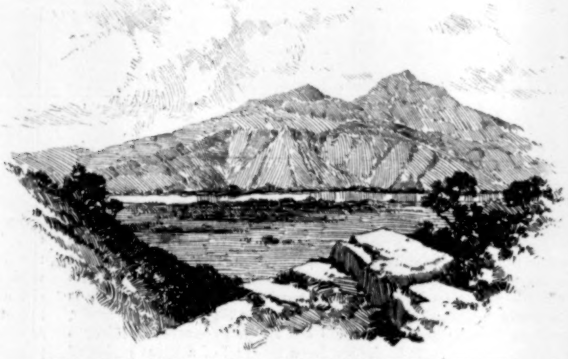
BY RICHARD J. HINTON.

WHITE snow brightens the gray and brown of the impurpled gorges, harsh rocks, and huge peaks of the sierras of southwestern Colorado. The sources of a great river are traced to the bleak crests of the snowy range and its advanced guard of sierras. It is a river, too, with a swelling name—the Brave Grand River of the North, as transformed into English from the mouth-filling Castilian. The Rio Grande, cutting its way through tumultuous foot-hills, bisects the valley of San Luis, now taking on a new beauty beneath the hand of industry. It pierces a rugged road through southern ranges, or, passing by their flanks, it cuts a marvellous cañon pathway beneath the gray walls of a crumbling communal life—that of the Mexican pueblos—which recalls the oldest and quaintest of three civilizations. It touches the northern border of Mexico, where mountain carrier and locomotive greet each other, and glances alike, as it speeds southward, on Texan "rustler" and Indo-Spanish "greaser." Channelling its way by broad shallow beds across the red harsh mesa, piercing in a series of magnificent cañons through the eastern spurs of the Sierra Madre, moving through lazy lagoons shimmering in the sunshine, and enriching the alluvial plains as it flows below Ringgold, the "Brave River of the North" finds its way into the summer waves that lave the eastern lines of our hemispherian isthmus, and hold on their breast the sun-bathed islands of the Caribbean Sea. What a story it tells as it makes its way from continued snows to perpetual summer!



A STREET IN MATAMORAS.

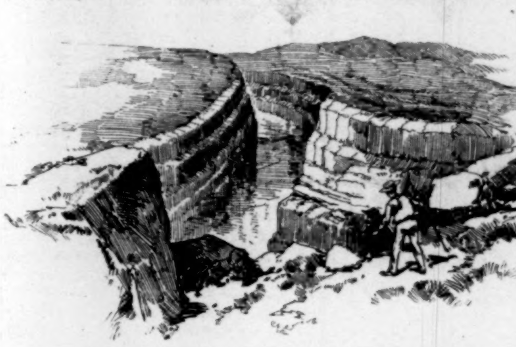
The great quartzite range of the San Juan, a huge promontory of the continental chain which forms the southwesterly rim of the wonderful bowl or park of San Luis, contains the chief sources of the Rio Grande. Here the river begins its long journey to the Gulf. This is nearly one hundred miles west and above the point at which it debouches into the valley. Antelope Park, the first point of interest in its downward course, is known as the scene of a conflict disastrous at the outset to Captain **John C. Fremont**, when in 1847 he started along this parallel on his memorable exploration. The junction, some twenty-two miles and upward westward of this park, of Deep and Pole creeks, or the middle and north forks of the Rio Grande, makes the main river, which thenceforward bears, with Anglo-Saxon terseness, the Spanish equivalent of Grand River. All the great area drained by this mountain river was once under the Spanish and Mexican flags, and it is fitting therefore that some, at least, of its swelling nomenclature should be retained. 'Tis a wild region in which these waters rise. One branch comes down from the Indian-named Uncompahgre Range, another from the Sierra San Juan, and the other pours out of the massive Sagauche Mountains. Geologists delight in the region. Eruption has forced its burning way in all directions. The huge march of the grinding glacier has left enormous evidence of its progress. Aqueous influences have hollowed the cañons and riven the mountains. Now it is the delight of the hunter and the fisherman. That daring errand-bearer of the Rockies, the Denver and Rio Grande narrow-gauge railway, has already climbed very near to the Antelope Park. The drainage of the mountains has widened the river, created this little and lovely mountain bowl, and in it set, like a superb gem of beauty on the brow of a lusty giant, the lovely Lake St. Maria, whose charm and attraction can be but imperfectly reproduced.*



THE SOUTHERN BOUNDARY OF THE UNITED STATES.

The forks of the Rio Grande come down from their mountain sources through dismal and lonely cañons too bald and rough to be picturesque. That of the middle fork is lofty, over 1500 feet, or nearly half a mile in height. The erosive forces which in all these stupendous formations have wrought such wild and fantastic shapes are seen here in the peaks, pinnacles, spires, turrets, and towers that crown the black basalt or break the sheer descent of its precipitous sides. Some aspects of these mountain cañons are of the wildest. The lovely Antelope Park breathes in beauty, like a blessing, over the rugged scene. It is but a little place, but its smile is sweet enough for all the Titan's huge features. Only two and a half miles from north to south, the river enters at the middle of the western rim, and then hugs the wall thereof, flowing across the park, until a mile beyond its eastern verge it again enters a bold cañon. The rugged and precipitous walls are seen in an illustration of the famous Wagon Wheel Gap, through which the Indians and the pioneers preceded the railway in scaling and overcoming the mountain obstacles to their marches and movements.

Downward foams the clear mountain stream, gathering volume and force as it flows. After leaving the cañon nearest the park it passes through and across a number of open intervales, which, with their picturesque beauty, and the fishing and hunting facilities afforded by stream and region, are yearly attracting a large number of tourists. Is it any wonder, then, that this should be so in the presence of such sublimity of scenery as is shown in this bold and striking view, near the gap, and now within sound of the laboring locomotive as it boldly climbs the up grade? Once through the Wagon Wheel Gap, southward can be seen an exquisite valley, hemmed in by the boldest of ranges, whose highest gorges hold continuously on them great masses of snow—a chaste robe that covers their worn and savage bleakness of aspect. Near by there is an old stage station, constructed of adobe, primitive and picturesque in appearance, much affected by fishermen and hunters. There is something more, also, in this whole region than the picturesque; something more than game for the hunter and sport for the angler. There is health for the invalid in the clear tonic of the mountain atmosphere. There is the opportunity of wealth for the hardy mining prospector and the sagacious promoter or capitalist. The whole region is slowly developing into rich mining districts. The clear dry air of the mountains in this latitude cures the succulent native grasses, and enables the ranchmen to utilize every acre of intervale and mesa, even to altitudes that farther to the north bring them within the snow-line. Cattle find open feeding even in winter-time.

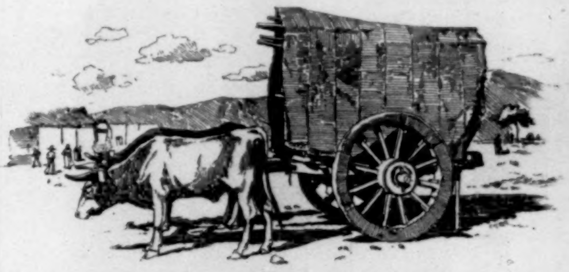


RIO GRANDE CAÑON.

In the centre of the valley the river turns toward the south. It retains that course, by a little easterly, until it enters the Gulf, forty odd miles below Brownsville, Texas. In the upper or western part of the valley, among the foot-hills where Del Norte, a thriving county town of 3500 inhabitants, is located, the little branches are quite numerous, swelling the larger stream with their quota of fertile water.

The average altitude is 7000 feet. The *ensemble* is one that combines in marvellous degree both beauty and sublimity. It may well be doubted if there is a spot on the continent which embraces the two in such magnificent harmony of proportion. The rarefied atmosphere of this altitude gives great clearness to the deep blue sky, across which the clouds, except in winter, are seldom seen in more than heavy drifts. The valley is to the enraptured observer almost a dead level. The foreshortening, which is so great a charm of this dry region, enables the human vision to take in its entire scope. As the traveller comes down into the park from Veta Pass, on the western side of the great eastern range or rim, the vast and distant swells, sides, and summits of the Sangre de Cristo, Sagauche, and San Juan ranges are within the restricted compass of ordinary human sight.

The loftiest mountain mass found in the eastern sierras crowns the valley in overshadowing proportions. The Sierra Blanca is the king summit of the Rockies, and, with one exception, the loftiest mountain within the United States. It wears a triple crown of three great peaks, singularly imposing in their aspect. From the plain below its vast bulk seems to rise sheer to its precipitous and altitudinous summit of 14,469 feet above the level of old ocean. This is more than two and a half miles of abrupt ascent. Rising from the great mountain park as it does, more than two-thirds of its vast bulk is above the timber line. So it stands in desolate grandeur, but not solitary, for it is upheld and supported by an embattled array of mountain heights that would seem stupendous in themselves if not lessened to the imagination by its own overawing bulk. Its mighty peaks are touched even in midsummer with the gleaming purity of the snow; but for most of the year it bares its bleak bald front to the golden sunshine and the clear azure of the arching sky. Within its abysmal gorges the icy glaciers rest in their eternal chill. Sunrise and sunset lend its black, brown, and dun gray sides and jagged summits the most imperial of robes. The gorgeous glory of a sunset in this valley surpasses description. But when its deep hues light the monarch of the ranges, every bleak rock and each deep gorge that scar and serrate its tremendous flanks and ridges take on a marvellous glory. The deep purple that glows in the shadows, and the glowing crimson hues that bathe as with fire the surface and swells of the overawing mountain, as well as the roseate flushes that flame so radiantly over the embosomed snow-drifts, make a panorama of color and scenery so entrancing and majestic that a world's journey would not be too great for one day's glimpse thereof. I shall not attempt to depict the glory of color and the shifting kaleidoscope of harmonious tones and hues which the rising sun brings with its beams as they fall upon triple peaks and enormous chasms. The gray mists of the fading night become golden and pink, rose-red and ultramarine, sapphire and topaz—all the colors and blaze of earth and sky meet and mingle to robe the great Sierra in appropriate majesty.

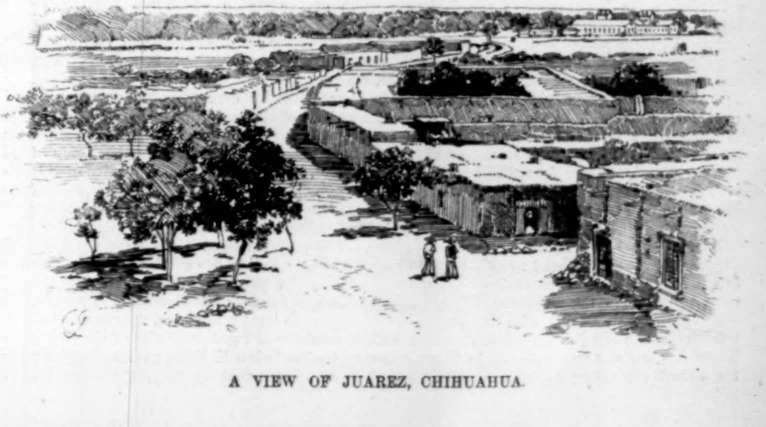


MEXICAN WOODEN WHEEL CART.

The western and central portion of the San Luis Valley is showing the enterprise of the American settler. In another article* the writer has given in some detail the changes in progress through organized introduction of irrigation. It is not confined by any means to this great mountain park, nor has it begun there to more than show what is to be accomplished in the transformation of wasteful cattle-ranches into grazing and breeding farms, wheat fields, orchards, gardens, and vineyards. Allowing for the sand-dunes at the foot of the Sangre de Cristo range, for the great, rugged foot-hills region all around the rim of this beautiful bowl, which will, however, furnish food for many thousand cattle, and for the swampy region around the San Luis Lake or lagoon, sure erelong to become a centre of supply to the more arid areas round about—allowing, I say, for all this, there remains a region in and from which the homes of 50,000 prosperous people can be made. A considerable Mexican population in the southern part, with their neighborhood and wasteful system of *acequias* and *zanjas*, or main and lateral ditches, have for the past two centuries proven that life can be sustained here in comfort. This great area was once the hunting-ground of Navajo and Ute Indians; the former of whom are grain and fruit growers, sheep-raisers, and weavers of fine blankets, as well as old-time warriors of the most daring character. Once these tribes made the valley of the upper Rio Grande a place of terror to the hybrid Mexican peasants, and put vigorous obstacles in the way of the more enterprising American. **Fremont** found this, and **Gilpin**, **Carson**, **Bent**, and others, also, whose names are familiar to the West of a short generation since. Fort Massachusetts, in the northeast of the Park, was established in 1847 to meet this hostility. Abandoned in 1849, Fort Garland, now the first station on the Rio Grande road as it comes down from the east across the Spanish Range and through the Veta Pass, was established. It is an uncomely place, with its squat adobe buildings, but to an unaccustomed traveller it is interesting as a typical southwestern United States post. It is not likely to be held much longer, with its reservation of 2500 acres, as the need of its continuance has passed.

Across the valley, from east to west, passes the Denver and Rio Grande road. Along its line are the pleasant and thriving towns of Alamosa, South Fork, and Del Norte. In the Rio Grande Valley there are some 70,000 acres already under water and cultivation. From Alamosa the road goes southward to the Mexican village of Antonito, now growing as a railroad point. The Denver and Rio Grande Railroad passes through the pleasant little park of Antonio to the south, and again climbs to the mountain plateau, moves across its bleak height for some forty miles, until it passes down again into the valley near Embudo, New Mexico.

The Rio Grande bends directly southward in the centre of the great park. The Sierra Culebra, a bold division of the eastern



A VIEW OF JUAREZ, CHIHUAHUA.

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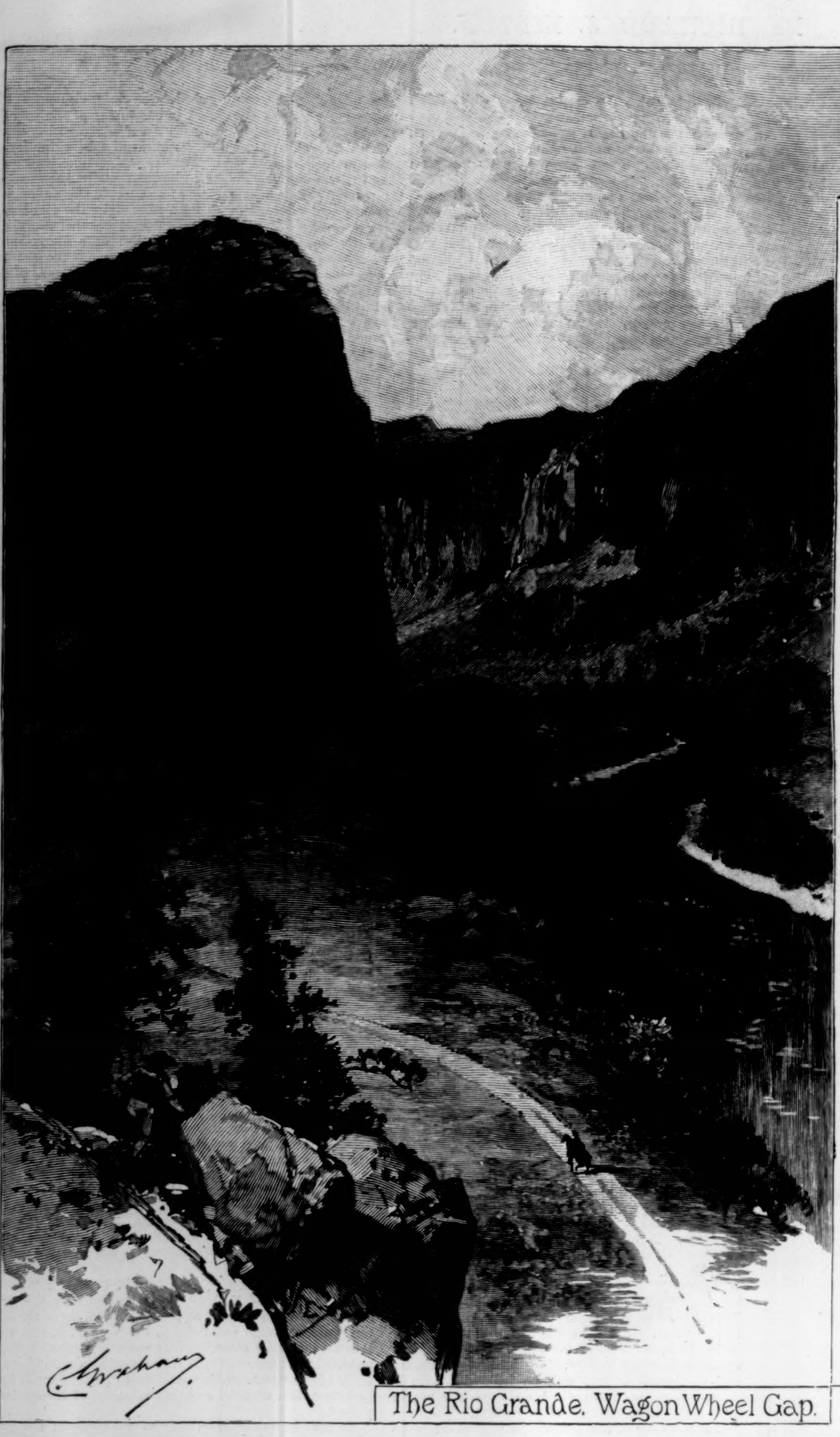
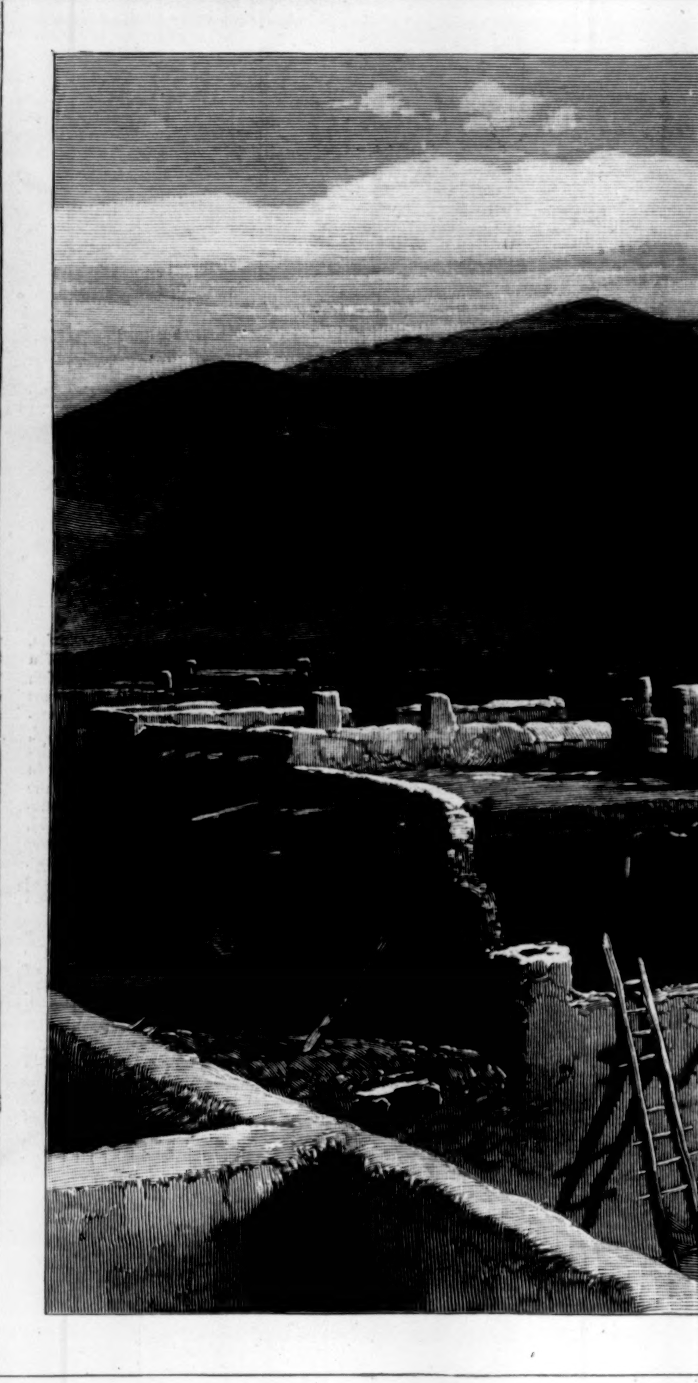
* The lovely view of Lake St. Maria, and others of the mountain scenery which enrich this paper, came from the photographic collection of W. H. **Jackson**, of Denver. To his skill and courtesy, as well as to the courtesy of the D. & R. G. Ry. Co., the writer is indebted for others of the Colorado and New Mexican scenes. He is also under obligations to photographer L. J. **Cookrell**, of Laredo, Texas, and to the officers of the United States Geological Survey, for whose willing favors thanks are hereby tendered.

* "Irrigation in the Arid West," **Harper's Weekly**, Sept. 22, 1888.



The Rio Grande. Wagon Wheel Gap.



or frontal range of the Rockies, forming the southeastern rim of the mountain bowl, marks the northern limit of the Costila Valley. All of this section is interlaced with small valleys, somewhat thickly settled with Mexican farmers and hamlets. They are an inheritance from Mexico, generally peaceful and orderly. We have less desirable communities even in this great Western valley. They raise sheep of a good breed, considerable grain, and some fruit. Their farming, like their irrigation, is of a "shiftless" character, and the wooden plough, local grain-mill (run by a handy mountain stream), laboring "burro," and clumsy hide carts are not unknown among them, though the enterprise and implements of "Los Gringos" have stimulated even them to imitative activity. From the eastern slopes of the sierras Culebra, Taos, and San Fé flow the many sources of the Rio Pecos, the largest tributary of the river under description, and the second most important drainage basin in New Mexico and northwestern Texas. It enters the Rio Grande several hundred miles below the border-line of the Territory, crossing the Llano Estacado, or Staked Plain, as well as draining the larger part of the eastern portion of the region which the Rio Grande bisects. The frontal ranges of the "Rockies" make a huge mountain region whose spurs and flanks form plateaus of high altitude, adapted generally for the feeding of cattle, and largely occupied as huge pastoral ranches. Some of these establishments are imposing, and, like the DORSEY ranch, with its residence, offices, and employés, make a small village. The river cuts its southward way almost in a direct line for over fifty miles, ploughing through the centre of the western plateau and foot-hills of the western and lower spurs of the Rockies, a continued cañon. It is almost unbroken for thirty miles, though two or three small creeks break its western wall. On the east there is nothing but a sheer side of basalt, of an almost uniform height of a thousand feet. At the southern extremity of this stupendous pathway—the Cañon de Taos—the river bends westward, and at the pueblo of Fernandez de Taos, in the creek of the same name, one may look up the dark gorge along its precipitous walls, from its swiftly rushing belt of water below, mirroring the narrow blue belt of sky above for almost the entire distance. The pueblo named is the most northerly of the twenty-one that still remain to tell us of the village Indian life of this region. This cañon forms a natural reservoir or storage basin, and at the point of debouchment into the open valley below the engineers will probably find ample means of conserving the supply, which has already swollen with the mountain drainage of at least a thousand square miles of territory. The Rio Grande below Taos, and until it reaches the southern limits of the Organ Mountains and the Sierra Blanca, in Texas, a hundred miles below El Paso, passes sluggishly for almost the entire distance, a wandering, shallow stream, making varying courses for itself, and losing much of its precious volume in "sinks" of sand and gravel. But it manages to support and feed the larger portion of the Territory's population, now rated at about 170,000. Certainly not over 35,000 are found away from the Rio Grande Valley and its immediate tributaries. At several points on its direct southward flow the river's course is narrowed and deepened by mountain ranges: below San Bernalillo, the Sierra Gandia; again, to the east of Los Lunas, the Joya Mountains, while a bold but single formation at Socorro makes a marked impression on the channel. It is the northern sentinel of a great series of ranges east of the river, known as the Oscura, San Andres, and Organ mountains, which for about a hundred miles form a continuous crescent, and enclose with their horns at north and south, their western foot-hills and the river, making an arid plain known as the Journado del Muerto, or Journey of Death. Toward the centre, and close to the river, where that desolate plain or *mesa* is broadest, is the Sierra Cabella. At the southern spur of this fine range the Deming division of the Atchison, Topeka, and Santa Fé Railroad crosses the Rio Grande by a bridge. Rincon is the junction of the main stem with the fifty-mile branch that goes directly south, hugging the eastern bank of the Rio Grande four miles past Fronteras, or the northern boundary of Mexico, to the new city of El Paso, in Texas, and the old, old presidio of Paso del Norte, now the city of Juarez, Chihuahua, and the northeast port of entry to the republic of Mexico. With infrequent exceptions, then, after leaving the cañon of Taos, the Rio Grande Valley is an open one till the centre of its channel becomes the legal southwest boundary of the United States. It is a fertile valley, as is shown in the fact that it supported a population of at least 130,000 Mexicans and Indians when General KEARNY, uncle of our gallant PHIL KEARNY, captured it from Governor DON ARMIJO and the republic of Mexico with a force of about 1400 men in all, operating at a distance of 700 and more miles from their base. Before that, and centuries too, its soil supported a much denser population than any that ever lived under the rule of Spain or Mexico, in Nuevo Mexicano and the Primeria Alta combined.

There is now a population of over 30,000 pueblo inhabitants; in 1850 it was about 15,000. The evidence abounds in the great ruins of the Rio Chelly and Cañon Chaco, in New Mexico, and along the Rio Maneo and other portions of the San Juan basin of Colorado, that a people who cultivated the soil and lived from it to the number of hundreds of thousands were dwellers in this region.

The rivers are always pathways for the peoples, and from southern central Mexico, the seat of Nahua, Maya, Toltec, and Aztec empires, along the valley of the Rio Grande must have passed the traders and soldiers, the caravans, the migratory tribes and communities who built the Casa Grandes of Chihuahua, the Rios Gila and Salado in Arizona, and the remarkable plateau and cliff cities of the C
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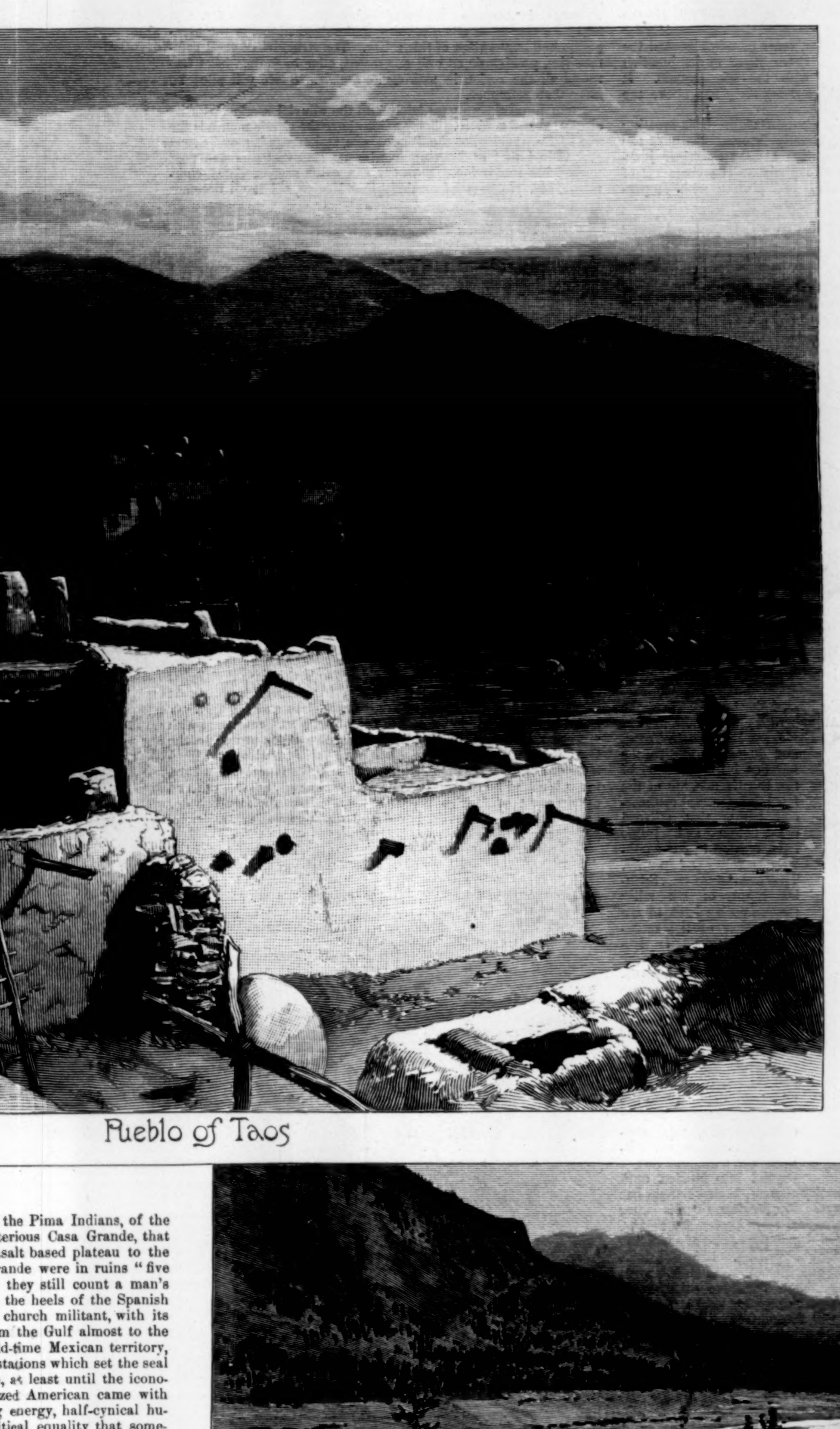
Pueblo of Taos

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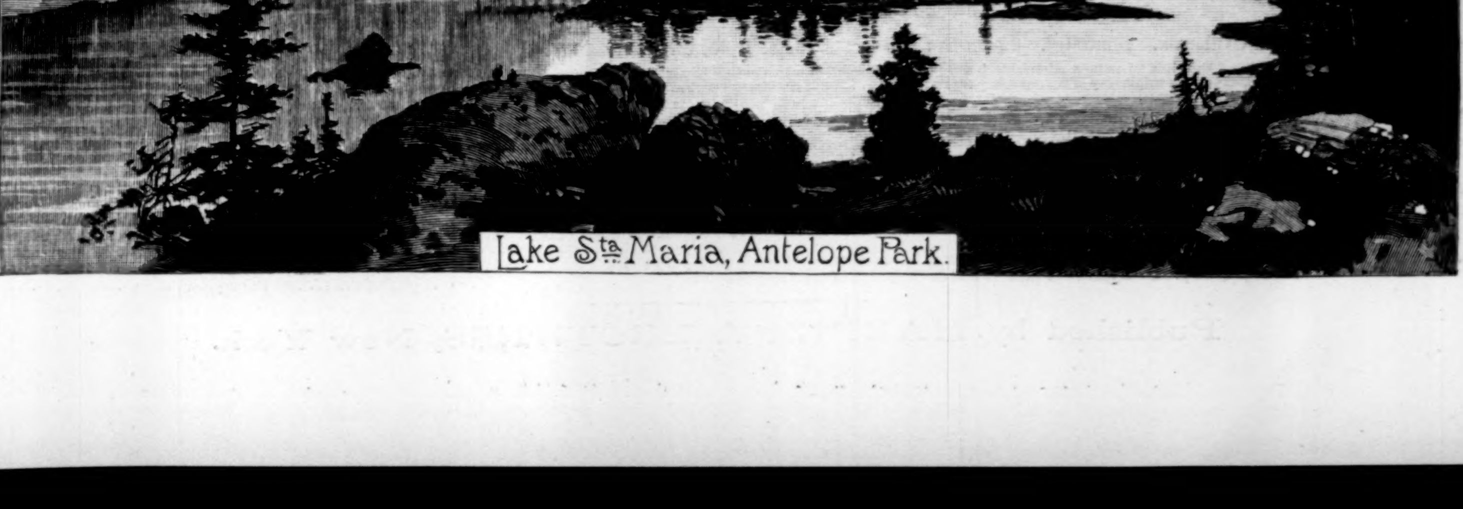
which has now set in will complete the awakening. It is not surprising, then, that this region should have been passed by those who certainly would never have been content to have turned furrows with a stick, or yoked oxen with a board across the horns. When it comes to having two men to carry a hodful of material, or the unmuzzled ox set to tread out the corn, the enterprising Yankee who was not desirous of wheting his appetite for sight-seeing in Palestine would be likely to turn aside in derision. But the Syrian threshing-floor may yet be seen in New Mexico, and more often in northern Mexico.

It is thirty years since an American journalist, brought by a curious love of adventure and stress of fate into the frontier village of Franklin, now known as El Paso, declared to his companions a conviction that they were passing across the site of a future city. Franklin had about 400 inhabitants then, to nearly all of whom but the half-breed peons might have been asked the brutal question of General CARLTON, addressed to stray settlers in Arizona when he was marching with a column of California cavalry up the valley of the Gila in 1862, "Well, sir, what made you leave the States? What man have *you* killed?" It was a gathering of ruffians, rangers, and ranchmen, soldiers and smugglers, gamblers, peons, harlots, and an occasional Irishman or Hebrew. That little party of five young men were passing from what were then the Cherry Creek gold-washings, at the present city of Denver, on an almost aimless series of adventures, which later nearly came to a tragical conclusion. They were riding through Franklin to the Mexican presidio of Paso del Norte.

Without doubt, this prediction has already been fulfilled. South of Denver there is no American place with so assured a present and so promising a future; yet none in naked natural aspects could look more unfavorable. East and south of El Paso, in Texas, for 250 miles in one way and 400 in the other, there is little but the gramma grass-covered table-land, marked here and there with a massive peak, a bold pichacho, or a clear-cut serrated range, standing defiant beneath the pitiless blue of the arching sky. To the northeast stretches the Staked Plain. Southward, with a slight easterly trend for nearly one hundred miles, rolls in a sluggish way the frontier river. Gathering volume and power, it then foams through a tortuous cañon region. The travellers passed over the alluvial valley-bottom and ferried the river, entering the republic of Mexico, to be examined by a squad of custom-house officers. It was an experience unknown before to all but one of this little party. Paso del Norte, now the city of Juarez, was a sleepy and rather virtuous presidio of about four thousand inhabitants, when compared with its bumptious little neighbor across the Rio Grande. It sat around its squalid church and bare, broken-paved, poverty-stricken plaza, so far as its dirty gray squat buildings were concerned, like a dusky toad in a ring of emerald and beneath a vast bowl of sapphire. Over it was the unbroken and burning azure. All about it, and down the river, on its western bank, were to be seen for a number of miles a continued vision of bush gardens, verdurous orchards, and luxuriant vineyards, while the silent, still atmosphere fitted in with the slumberous Oriental aspect of the whole landscape. Beyond these, in Chihuahua, to the south and west, was naught but huge dunes and hills of shifting sands and the gray-hued gramma-covered table-land, with always near and afar off the purple-hued, deep-gorged, and saw-toothed sierras.

The two cities are, however, very much alive in these days. This is especially true of El Paso, in which every one drives business with American energy. In Juarez, however, even Americans are inclined to the Mexican indulgence of a noonday *siesta*. The old place is an attractive one for a day's sight-seeing. There is a considerable Mexican garrison, and the slouchy, sturdy little soldiers are worth looking at. On our side, a couple of miles above El Paso, Uncle Sam's "Old Glory" flies radiantly from the garrison flag-staff of Fort Bliss. His trim-looking, well-clad, and well-fed regulars afford a striking contrast to the Mexican "boys," whose chief duty nowadays is to guard the treasure and trains on the Mexican Central road. Juarez has not changed, outwardly, a great deal in the past thirty years; but the changes were fewer in the previous three hundred years. The Catholic mission was established early in the sixteenth century, and there was an Indian pueblo of importance at this point for a long time before that. The old church is the quaintest structure in the city, homely as it is; while the handsome adobe-built depot and offices of the railroad are interesting because they indicate the new life, and show, too, what use can be made of a most unpromising building material, which, however, is fittingly adapted to climate and conditions. The railroad's staff fill quite a prosperous little town of its own. There are more fields to the south. Chinese do the gardening instead of the former peons, who are now railroad laborers or working over the river. There are more adobes and more people; about 8000 now against 4000 thirty years since. The stores are not much larger. There are more contraband goods about; everybody smuggles in Mexico, not excepting the customs officials. There are more ruffians and rowdies also, and they are generally from the American side. Drinking and dancing places are too numerous by far; and there is also an international street-railway, running from El Paso's central hotel (part of which was once the adobe barracks of DONIPHAN'S Missouri command) to the Mexican central depot in Juarez. Everybody uses it for personal smuggling, and everybody agrees, though the customs officers of both republics search each car as it jolts from road to bridge at either side of the river. Mexican streets are badly cobbled, and those of Juarez will "take the cake" for roughness. The plaza is still broken, ugly, and unkempt. The little church has served several times as a fortress, the last time being for a considerable period during the so-called empire of MAXIMILIAN.

El Paso has now a population of about 7500. It does the business of 50,000. Its outlook is larger than that, located as it is on the frontier of Mexico, and with all the Southern continental railroads centring within its streets. It has commerce galore, a great carrying trade, is the outlet of a vast cattle region, and is becoming the ore market and reduction centre of one of the greatest of mining areas. It is full of rude picturesqueness. All sorts and types meet and mingle here. As in the past, those who find civilization dangerous to their personal liberty are apt to seek refuge in this remote region. There is a good deal of the swagger and but little of the traditional frontier hospitality. But there is plenty of "go," and a bit of El Paso life will form a lively chapter in the record of any live man's experiences. There are handsome and showy buildings here, but the majority are adobes, and dilapidated at that. "Jacals"—Mexican huts—are abundant, and dirty too. The streets throng with tender-foot and cow-boy, with merchant and miner; men of all colors and lands meet and mingle. Five continental railroads already centre in El Paso—the Southern Pacific and the "Sunset" route, its New Orleans ally; the Texas Pacific; the Atchison, Topeka, and Santa Fé, with the Mexican Central. Besides these, local and railroad influences are constructing a coal and ore feeder direct to White Oaks, to the north. The Rock Island corporation are pushing southward from Kansas through eastern New Mexico to this place. Other roads in the near future will be the Colorado and Santa Fé, a continuation of the St. Louis and San Francisco road, and a narrow-gauge Mexican system, designed to open the Sierra Madre. All these facilities are dependent on a vast development, which is already beginning. The transformation of the Rio Grande Valley for miles by means of irrigation is an incident of no secondary importance.


Lake Sta Maria, Antelope Park.